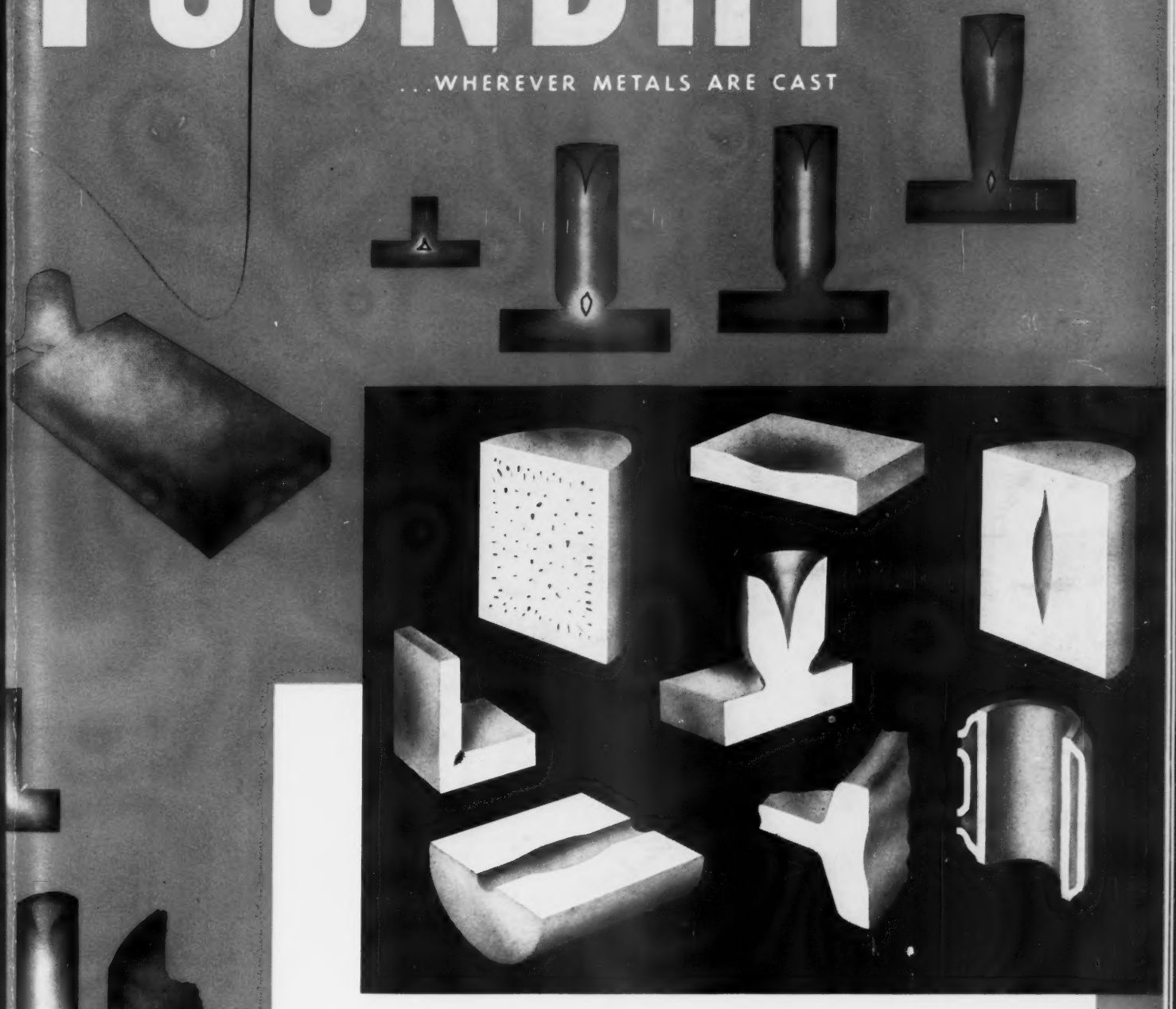
FEBRUARY 1953

FOUNDRY

...WHEREVER METALS ARE CAST



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Don't Neglect the Human Factor, p. 97

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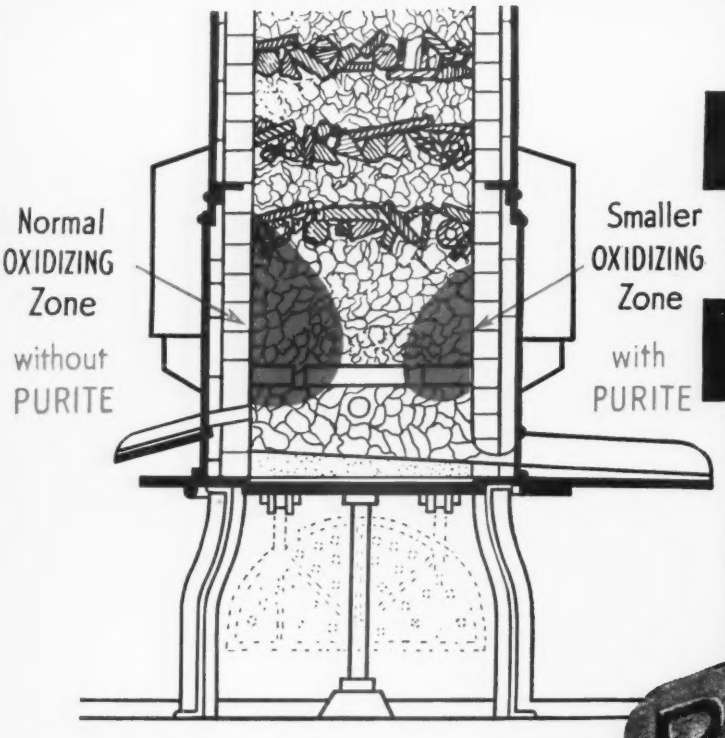
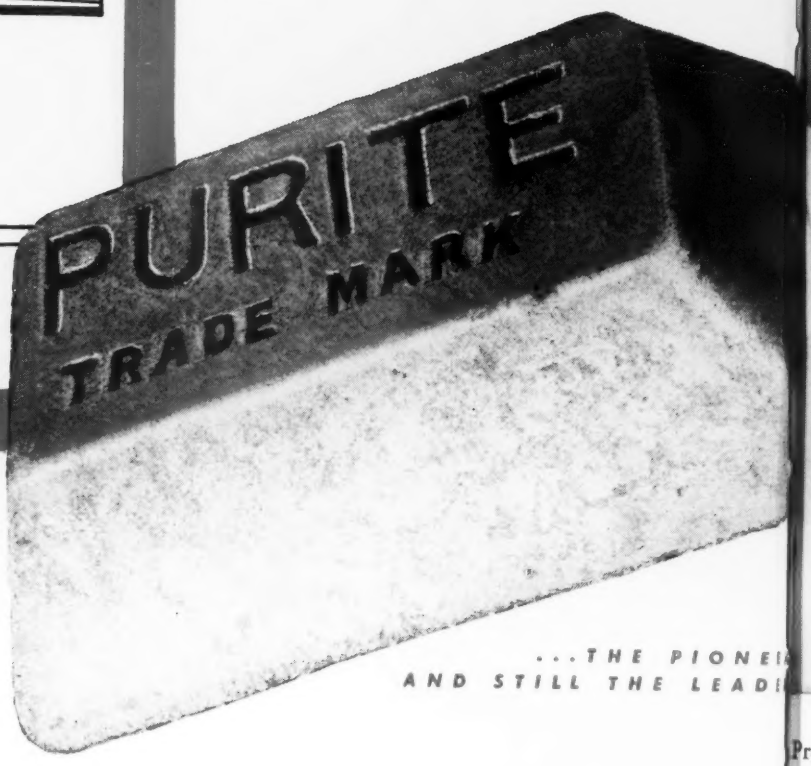
Keep Production Unifor

with PURITE in Every M





...THE PIONEE
AND STILL THE LEADE

Purite produces a sodium (yellow) flame in the melting zone of the cupola and accelerates the combustion reactions $C \rightarrow CO_2 \rightarrow 2CO \rightarrow 2CO_2$, thus speeding up the combination of oxygen in the blast and carbon in the coke. In this way, Purite limits the zone of free oxygen in the cupola to a smaller hotter area, reduces oxidation of the metal and increases melting temperatures.

To get top production of finished castings from every melt, be sure you flux and desulphurize with Purite. It forms a highly active refining slag in the hearth of the cupola which expels entrapped gases and reacts with the impurities picked up by the iron in trickling down over the coke. Non-metallic inclusions are converted into liquid sodium-silicates that rise out of the metal and are carried off in the slag. Thus Purite, by expelling the impurities, which cause pinholes and segregated defects, improves the soundness and machinability of iron castings and reduces foundry losses.

For over 30 years, Purite has been the choice of leading foundries everywhere. Here's why:

1. Purite produces a higher percentage of finished castings per ton of metal poured.
2. Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.
3. Purite gets to all the iron quicker.
4. Purite is time-tested and proven for unsurpassed desulphurizing uniformity.
5. Purite comes in 2-lb. pigs and 2 oz. tablets—no weighing or measuring required.
6. Purite is 100% pure fused soda ash—you do not pay for inert materials.
7. Purite does not crumble—no waste—no dust.
8. Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada.

MATHIESON

MATHIESON INDUSTRIAL CHEMICALS COMPANY

Division of Mathieson Chemical Corporation

Baltimore 3, Maryland

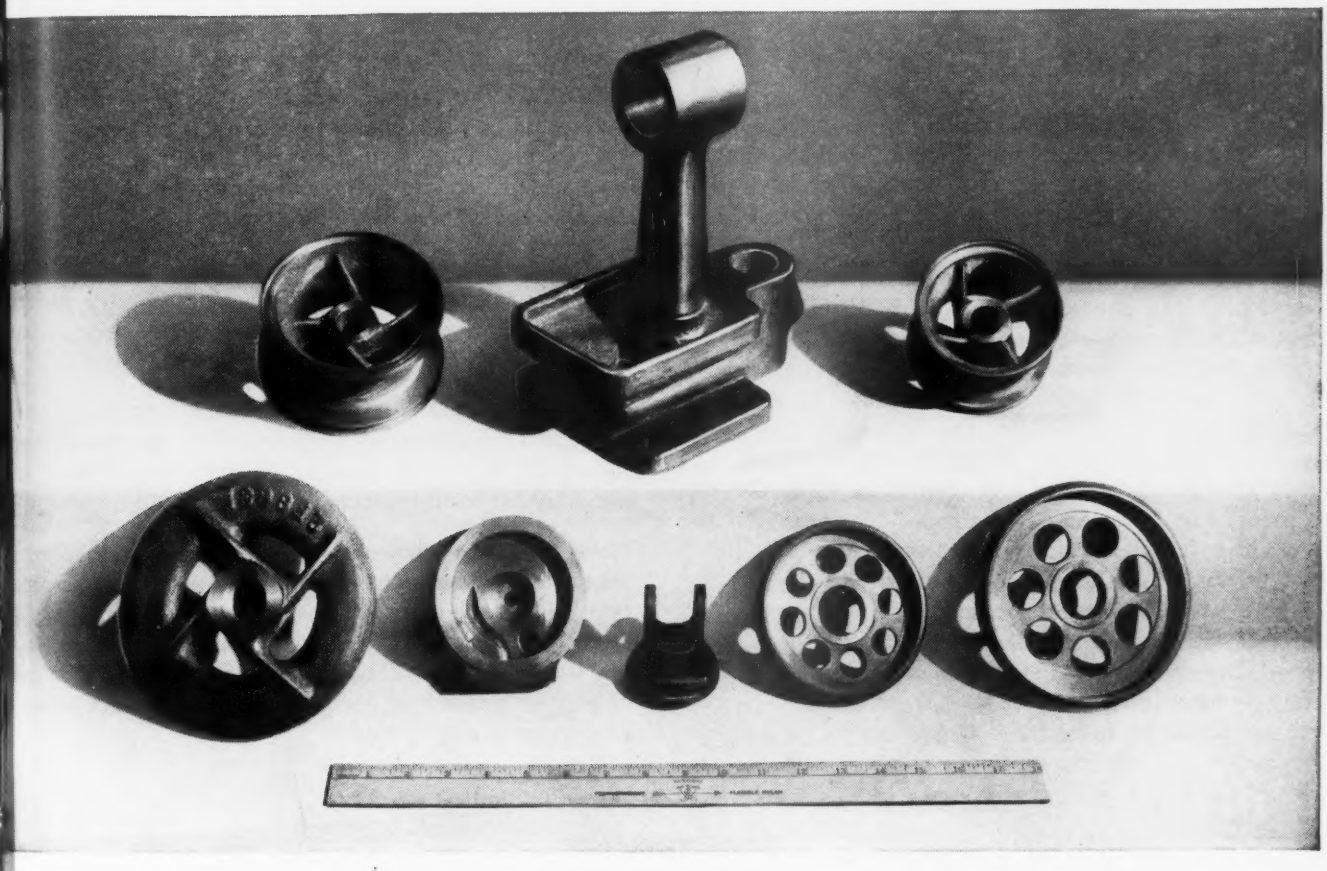
9866-

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEA

NISILOY*

to eliminate hard chilled areas in gray iron castings

. . . REDUCE machining time, tool wear, rejections



Produce *machinable* gray iron castings regardless of sharp variations in section thickness . . .

Eliminate localized hard areas or chilled (white) edges and surfaces . . .

Reduce machining time, tool wear and rejections . . . *raise both quality and quantity of your output by controlling gray iron structure with small ladle additions of NISILOY.*

Designed specifically to promote better machinability, NISILOY is a powerful innoculant and graphitizer containing about 60% Nickel, 30% silicon, balance essentially iron.

Mail the coupon now . . . for your *free* copy of a booklet that describes how Nisiloy helps you improve structure and machinability of gray iron castings.

*Trade Mark of The International Nickel Company, Inc.

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TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC.
Dept. 20, 67 Wall Street, New York 5, N. Y.

Please send me your booklet entitled,
"NISILOY" for GRAY IRON CASTINGS.

Name.....*Title*.....

Company.....

Address.....

City.....*State*.....

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

WHY MOST FOUNDRIES USE SEACOAL, BENTONITE AND SAND STABILIZER FOR THE PREPARATION OF FACING SAND

Here are the reasons why an o whelming majority of iron found for many years, have found molding sands prepared with sea bentonite and sand stabilizer defi ly can be relied upon for unif advantageous and thoroughly s factory results . . .

EASY TO USE—Because they are finely ground, dry materials, seacoal, bentonite and sand stabilizer are easy to handle, easy to add and mix with sand. Seacoal and bentonite are ground and screened in a variety of grades to suit the requirements of every type of work.

EASY SAND CONTROL—It's easy to control all of the important physical characteristics of molding sand with seacoal, bentonite and sand stabilizer. By adding the proper amount of seacoal, the carbon content can be controlled at will and changed to suit the job. Through the use of bentonite, the green and dry strength of the sand can be varied as required. The ad-mix of sand stabilizer provides control of flowability, so molds can be rammed to proper hardness. At the same time, it reduces the possibility of "buckles", "blows", "scabs", "swells", "cuts", etc., by fortifying the sand to insure proper expansion and contraction. The safe moisture range of the prepared sand is also broadened. Depending on the job to be made, moistures can safely be run higher, because sand stabilizer attracts considerable moisture to itself.

LOW COST SAND—It's not necessary to use a speci grade sand or a fine mesh sand for this method of sa preparation. Any grain size may be used, so permeab ity is easy to control. And common lake sand may added to the mixture as replacement.

BETTER CASTINGS—This type of sand preparation i sures the production of good castings. Better casti finish is definitely obtained—pattern-true, free of su face imperfections and free of distortion.

BETTER SHAKEOUT—Cleaner, better and less-lum shakeouts are obtained with sand thus prepared. Sa adherence is greatly reduced, thereby minimizing t necessity for sand replacement to the heap or system

LOWER COSTS—Seacoal is extremely low in cost. prominent automotive production foundry determin that seacoal actually costs them only 25c per ton castings produced. Bentonite and sand stabilizer, t are inexpensive additives. Furthermore, low cost sa of proper grain size may be used for replacement, keep costs to a minimum.

CROWN HILL SEACOAL ANALYSIS

Proximate
(Moisture Free)

Volatile Matter	38.9%
Fixed Carbon	57.4%
Ash	3.7%

Ultimate

Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
Fusion Point	2780°F

CROWN HILL Seacoal, mined by FEDERAL at Crown Hill, West Virginia, is *high* in volatile combustible matter and *low* in sulphur and ash content—basic requirements for a top quality seacoal. Check the analysis of Crown Hill Seacoal shown at the left, prepared by the U. S. Bureau of Mines.

GREEN BOND Bentonite, produced and guaranteed by FEDERAL, is unexcelled in uniformity and ability to develop and control green and dry strength. It produces high green and dry strength in sharp sands even when comprising but ½% to ¾% of the entire mixture. Truly the best of the bentonites!

FEDERAL Sand Stabilizer is a processed cellulose sand additive, greatly superior to wood flour, cereal binders, iron oxides, etc. Its high combustibility allows sand to expand evenly to eliminate casting defects. It increases sand flowability, providing much better ramming conditions. And it attracts moisture to itself, to broaden the safe moisture range.

AND HERE'S WHY THEY PREFE

CROWN HILL Seacoal, GREEN BOND Bentonite and FEDERAL Sand Stabilizer . . .

* * *

To learn how your foundry, too, can be assured of tailor-made sand for every job, plus easy control of the important physical characteristics of sand, at low cost—write us for informative bulletin on the use of Crown Hill Seacoal, Green Bond Bentonite and Federal Sand Stabilizer.

FEDERAL

The FEDERAL FOUNDRY SUPPLY *Company*

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FEBRUARY 1953

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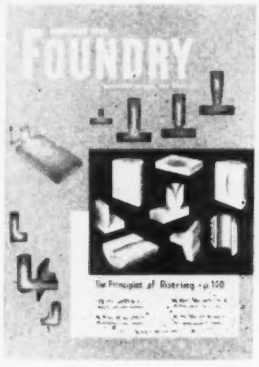
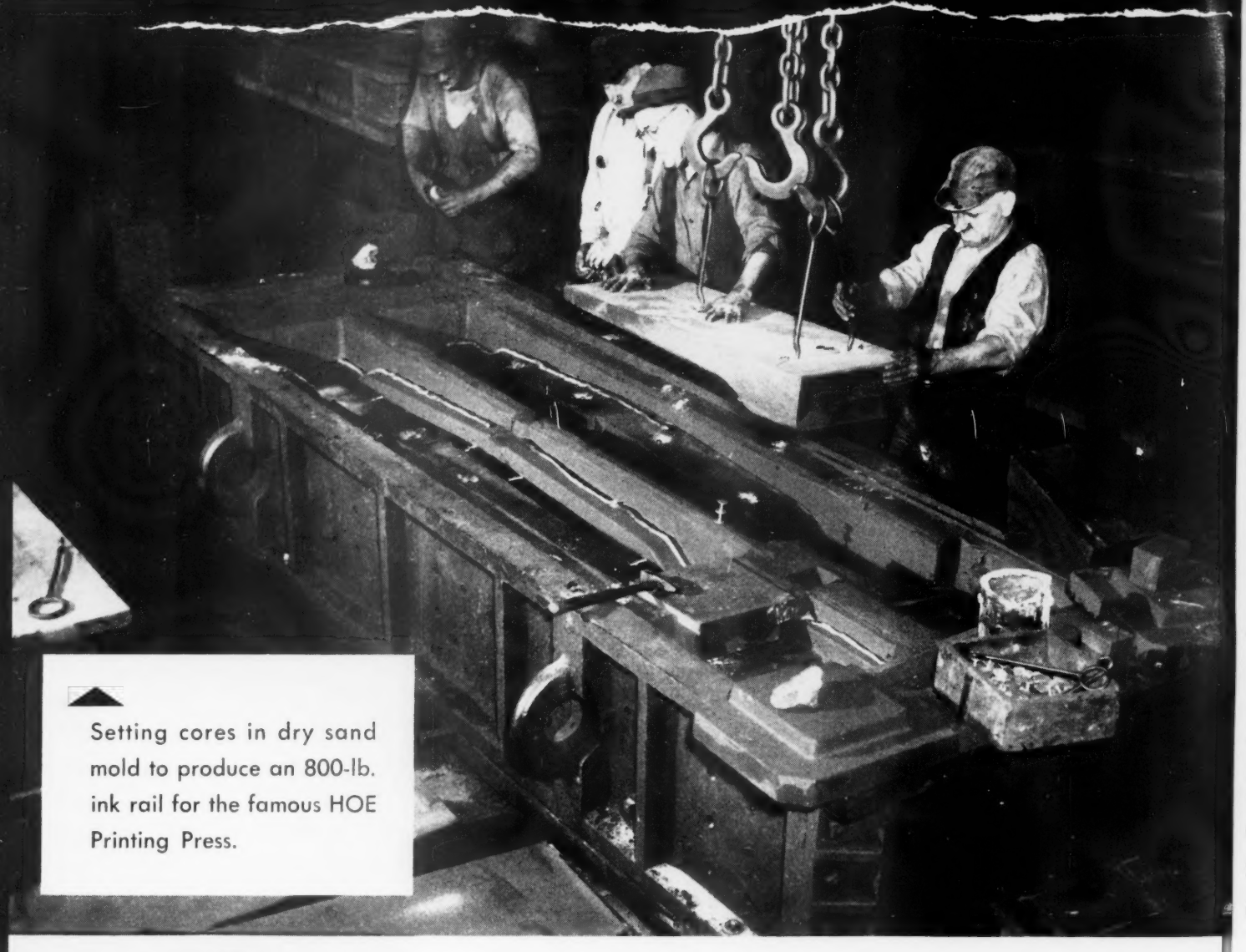


THE COVER: Showing some of the examples of metal solidification in risers as discussed in the article starting on page 100

INSEPARABLE FOR



Setting cores in dry sand mold to produce an 800-lb. ink rail for the famous HOE Printing Press.

Cores for ink rails (see above) are made ready for over-night bake at 375-400° in oil-fired batch-type oven. Sand-LINOIL ratio of 50 to 1 by volume is used.

R OVER 1/4 CENTURY

HOE

uniform LINOIL plays important part in production of quality cores at R. HOE & CO., INC.

The Dunellen (N. J.) Foundry Division of R. Hoe & Co., Inc., pours semi-steel castings of all sizes for their famous high-speed printing presses. Giant machine tool bases ranging up to nine tons is also their business.

The size and cost of such work calls for fool-proof cores, unvarying in strength, hardness and collapsibility. That's why the core room foreman at Hoe has used trouble-free LINOIL for 26 years! They can depend upon its uniformity to produce consistent cores without having to vary the mixture from month to month.

Your LINOIL representative will be pleased to demonstrate LINOIL in your core room. Ask him next time he calls, or write direct to the address below for more information.

just off the press

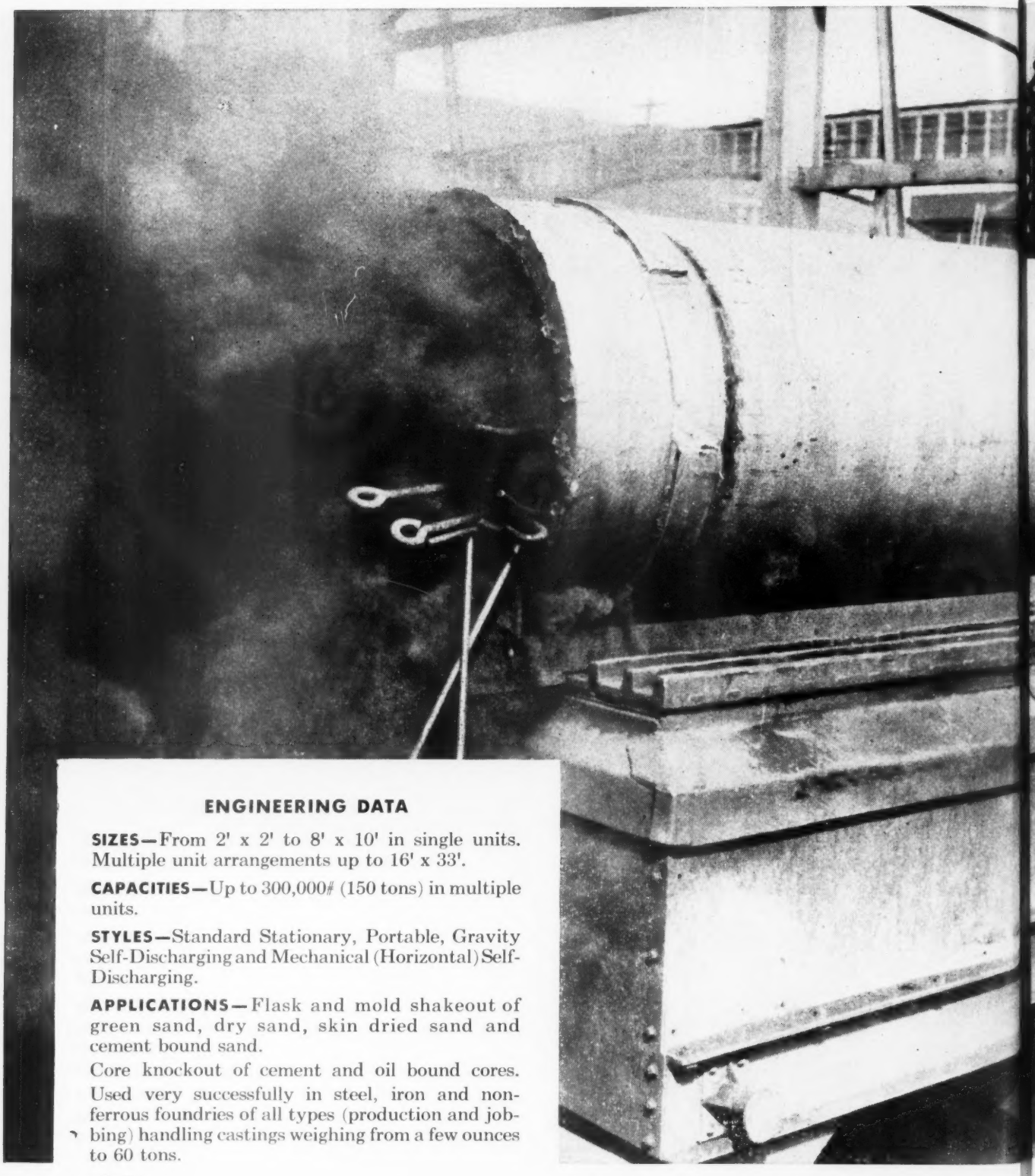
New bulletin on Archer LIN-O-CEL Sand Stabilizer tells how to improve flowability, prevent rat-tails, buckles and scabs. Write for your copy TODAY.

ARCHER·DANIELS·MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110th STREET • CLEVELAND 2, OHIO

PRODUCERS OF LINOIL INDUCTOL FREFLO LIN-O-CEL

Floatex Shakeout Saves



ENGINEERING DATA

SIZES—From 2' x 2' to 8' x 10' in single units. Multiple unit arrangements up to 16' x 33'.

CAPACITIES—Up to 300,000# (150 tons) in multiple units.

STYLES—Standard Stationary, Portable, Gravity Self-Discharging and Mechanical (Horizontal) Self-Discharging.

APPLICATIONS—Flask and mold shakeout of green sand, dry sand, skin dried sand and cement bound sand.

Core knockout of cement and oil bound cores.

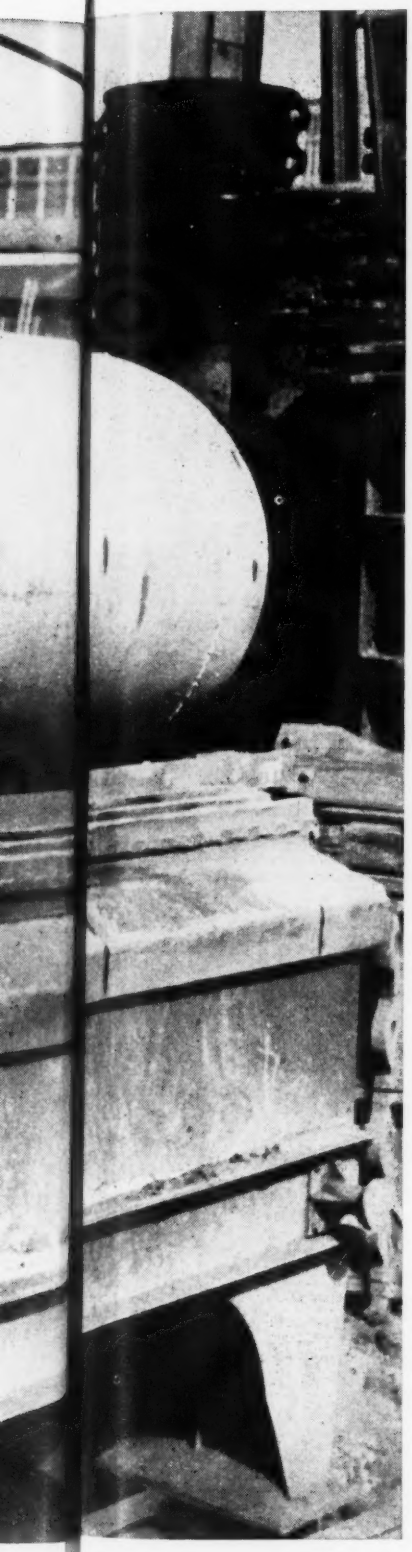
Used very successfully in steel, iron and non-ferrous foundries of all types (production and jobbing) handling castings weighing from a few ounces to 60 tons.

HEWITT-ROBINS INCORPORATED

HEWITT-ROBINS

DIVISIONS: HEWITT RUBBER • ROBINS CONVEYORS • ROBINS ENGINEERS • RESTFOAM®

es 7½ Man-Hours Per Casting



Floatex Shakeout Scores Knockout On Cement-Bonded Sand Core In Less Than 20 Minutes!

CUSTOMER'S PERFORMANCE RECORD

EQUIPMENT:

72" x 120" Hewitt-Robins Portable Floatex® Shakeout.

LOCATION:

The Pusey and Jones Corporation Foundry, Wilmington, Delaware.

CASTING:

Thin-walled paper mill autoclave liners weighing 8000 pounds—measuring 9'5" by 40" diam.—sealed at one end.

CORE:

Hard cement-bonded sand weighing approximately 8000 pounds.

PERFORMANCE:

Less than 20 minutes total knockout time . . . 7½ man-hours saving per casting. During 30 months of operation, in spite of terrific metal-to-metal impact during high-speed knockout, absolutely no casting damage.

RESULT:

Pusey & Jones report unit paid for itself in just one year of operation because of time saved and lack of casting damage.

CHECK FOR INFORMATION ABOUT THESE JOB-TESTED PRODUCTS FOR YOUR FOUNDRY

- ☐ FOUNDRY SHAKEOUTS
- ☐ SSC UNIT

CONVEYORS:

- ☐ —Belt
- ☐ —Vibrating

BELTING:

- *☐ —Hot Materials
- *☐ —General Conveyor
- ☐ —Woven Wire

HOSE:

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- ☐ CAR SHAKEOUTS
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- *☐ RUBBERLOKT® BRUSH

*For immediate information about these industrial rubber products, call your Hewitt Rubber Distributor. (See "Rubber Products" Classified Phone Book).

Hewitt-Robins Incorporated
666 Glenbrook Road
Stamford, Connecticut

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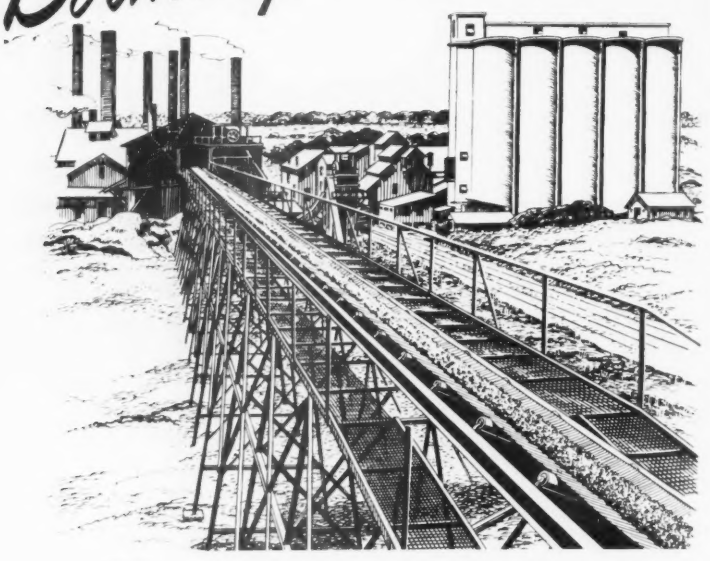
Birmingham's CONTINENTAL GIN COMPANY

Diversifies and Expands with the... *Surging Southeast*



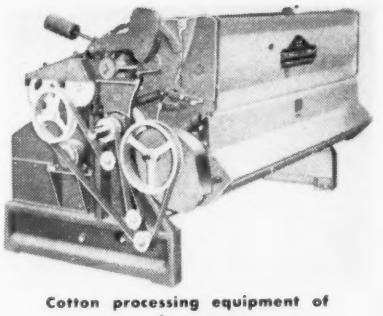
TYPICAL of the way industry develops and diversifies in the manufacturing and distribution center of the fast-growing Southeast is Birmingham's Continental Gin Company.

Established in 1833, soon after Eli Whitney invented the cotton gin, this Company made nothing else but cotton gin machinery for more than a century. In this field it is the world's largest and best known manufacturer.

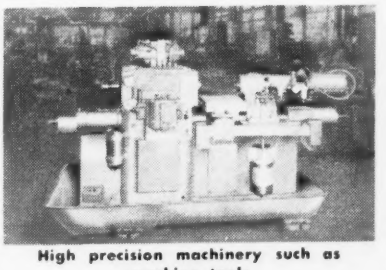
To serve the growing market for diversified industrial equipment, the Company added in 1936 Industrial and Special Products Divisions. Today these departments make hundreds of different products. They design, engineer and manufacture a complete line of power transmission, materials handling equipment and custom-built machinery for mines, textile and paper mills, synthetic fiber, chemical, rock products, food processing plants and the machine tool industry throughout this country and the world.

Merrill E. Pratt, president, credits a major part of the Company's successful diversification and expansion program to its Birmingham location. He says:

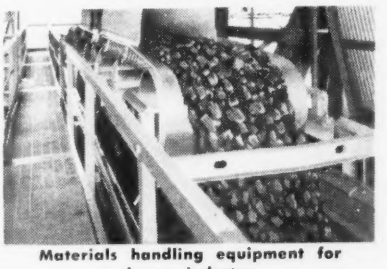
"Birmingham's central location in the Southeast and this district's superior transportation facilities have given us a great advantage in serving not only fast-growing Southern markets but also our customers in all the 48 States. Efficiency of our dependable, native craftsmen is very high. They produce all types of equipment of the same quality standards as our original product —cotton gins. Here, too, are abundant, low cost fuel and power—in fact, an ideal correlation of favorable factors for economical production and distribution."



Cotton processing equipment of various types

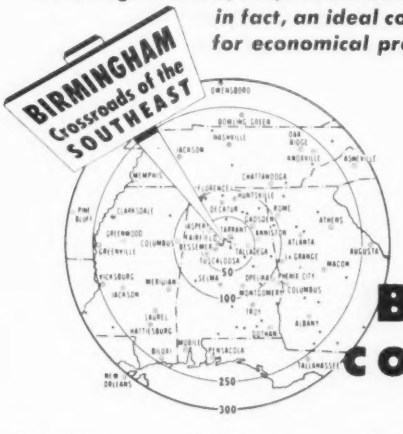


High precision machinery such as machine tools



Materials handling equipment for heavy industry

★ ★ ★ ★ ★ ★ ★ ★



If yours is an expansion-minded industry, interested in serving growing Southern markets, the Birmingham Committee of 100 invites you to investigate the advantages of Birmingham as a manufacturing and distribution point. For specific information, write this Committee or any of the undersigned.

BIRMINGHAM
COMMITTEE OF 100
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United States Steel Co.

Art in Iron...

ART in Iron is just as challenging in our day as when the South went in for its lacy grille work that brought sheer architectural beauty to so many homes.

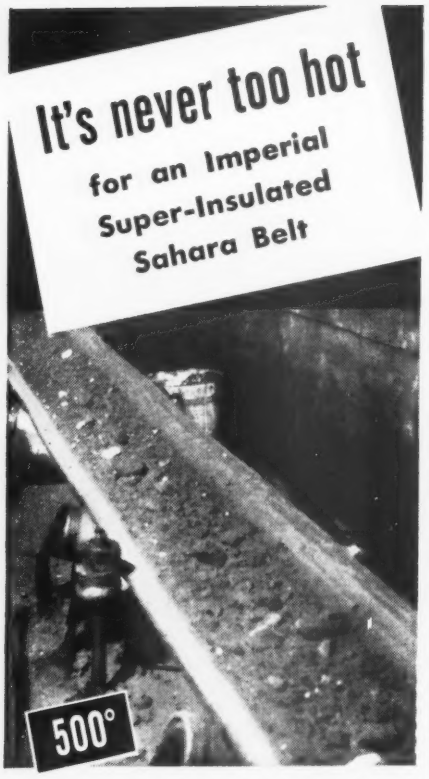
The Lincoln plaque we show was done in iron by a master craftsman of today. The surface texture of the metal is beautifully smooth and light throws shadows in every shade of grey across this face, adding a sense of reality to the feeling of timelessness which iron itself suggests.

There is another type of art in Iron which is used and lost in the production of every casting—the art of the craftsman who makes the cores and molds. No casting can be better than the sum of the skills and material that go into its make-up and, as a supplier of core bonding material, United is proud of its small contribution to the artistry of iron.

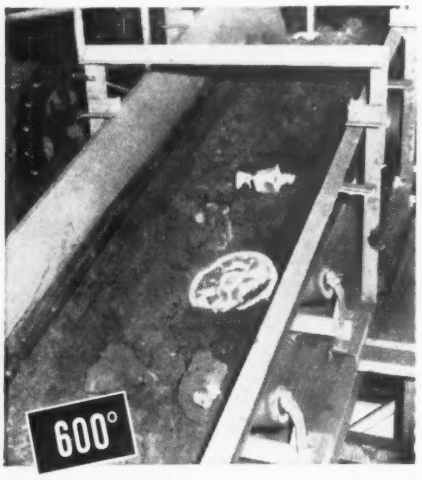
On this anniversary of Lincoln's birth, you may wish to read again his letter to Mrs. Bixby—probably the kindest expression of sorrow and sympathy in all written language. We will be glad to mail a copy on your request.

UNITED OIL MFG. COMPANY
1429 WALNUT ST. ERIE, PA.

Photo of the Richards House in Mobile, Alabama.



At American Chain & Cable Co., this belt ran 24 hours a day, 5 days a week for over 2 years—handling hot shakeout sand with temperatures up to 500°. During this time production was accelerated and equipment operated at top speed.



$750 per hour shutdowns were eliminated by a farm implement company when they installed this belt to convey white-hot castings and knockout sand. Result: $30,000 saving in 12 months.

• • • • • •

Write for data sheet 47-8 and case histories on belts for handling hot materials.

Imperial BELTING CO.

1755 S. KILBOURN AVE., CHICAGO 23, ILL.

Engineered Belting—
The Right Belt for Each Job

With the EDITORS

PRODUCTIVE and Enjoyable: The editors continue to receive comments on the 60th anniversary of FOUNDRY, which was marked in the September issue last year. The latest to cross my desk, and one of the finest compliments the publication has received, appeared recently in *Modern Melting*, a publication of the Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich. In his special column, "Melting Points," Bruce Shafer, sales manager of Detroit Electric Furnace, presented the following under the heading, "The Foundry—A Basic Industry and the Magazine That Serves It:"

"In September, 1952, FOUNDRY magazine celebrated its sixtieth year of existence. In 1892, when John A. Penton published the first issue, the foundry industry was just starting to come out of the dark ages. Mechanization of any industry to mass-produce was suffering birth pangs. Since then, much progress has been made in both the products and in the plants of the foundry industry.

"Such progress is not the work of one, but of many men—men who recognize that other workers in the field also have ideas and that all can profit by interchange of new ideas, their evaluation and testing. Into such a picture stepped the FOUNDRY magazine to provide another means of communication.

"As our industrial economy became more complex, so did the foundry industry and the job of reporting new developments. Throughout the years, FOUNDRY has done such a remarkable job of reporting and promoting new ideas that it becomes questionable as to who is leading whom. Certainly, FOUNDRY is read in every foundry and has become the bible of foundrymen in the western hemisphere and, we suspect, the world.

"Not only has FOUNDRY served your industry in the reporting sense, but also in a very constructive capacity. Because its staff was familiar with the fundamental role of foundries in defense production, FOUNDRY personnel played a large part in guiding procurement and production policy-making groups in Washington during emergencies.

"Congratulations, FOUNDRY, on your sixtieth birthday and may your next sixty years be as productive and enjoyable."

Thanks so very much Bruce. All of us hope that we can keep on building and serving this great industry.

—o—

A Lot of Copper: Wm. Lewis Todd of the School of Engineering and Technology, Pasadena College, Pasadena, Calif., recently wrote: For two years I have been nursing 300 lb of red brass because of the shortage of copper, and then look what I found in yesterday's *Los Angeles Times*: ". . . The bronze cross topping the dome weighs 650 pounds. The roofs, including those of the dome and bell towers, are of 20-ounce copper with a total weight of 25,000 pounds. . . ."

—o—

Bienvenidos: When the members of the Southern District of the Steel Founders' Society of America recently arrived in Mexico City, Mex., they found the entrance of the Del Prado Hotel decorated with a large sign reading "Bienvenidos Steel Founders' Society of America." Either the hotel management was really fond of these foundrymen from north of the border, or those in charge of

(*Continued on page* 12)

in one foundry — cost records show...

HARBISON-WALKER KUPLOMIX *saves 53%* IN CUPOLA LINING MAINTENANCE

The economical material for the construction and maintenance of joint-free linings

H-W KUPLOMIX is a high grade mixture of grain-sized silica (quartzite) and refractory bonding clay. It is shipped in moisture-proof sacks of 100 pounds net weight, or in bulk, ready for immediate use by mixing with water.

H-W KUPLOMIX is easily applied by means of air placement guns or by ramming. It provides durable joint-free linings at highly economical material and installation costs.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
World's Largest Producer of Refractories
General Offices: Pittsburgh 22, Pa.

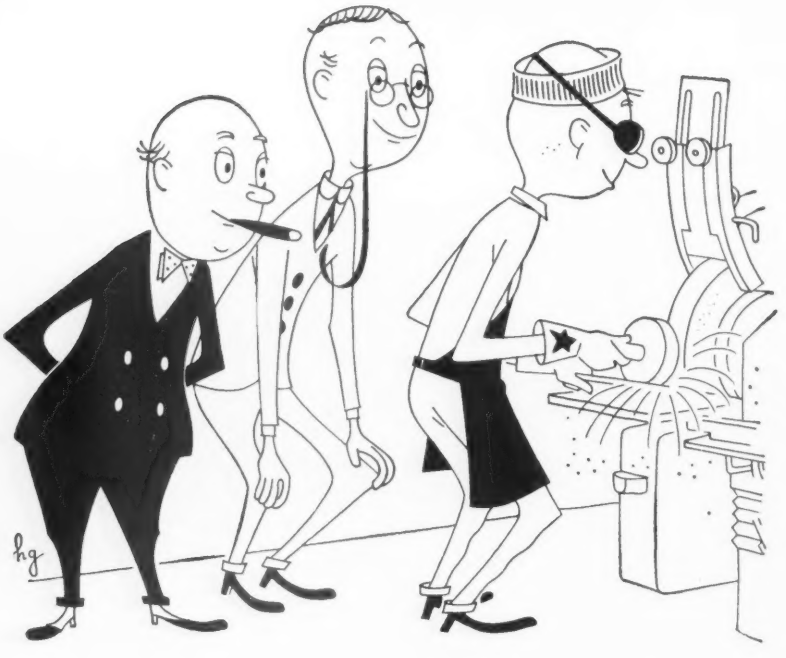
At a gray iron foundry, cupola lining costs were compiled both on the basis of maintenance with fire brick and the usual patching material—and on the basis of using H-W KUPLOMIX. A comparison of these figures shows an annual savings of 53% in overall maintenance cost by the H-W KUPLOMIX method!

The excellent service rendered by H-W KUPLOMIX is attributable to its outstanding physical and chemical properties.

- H-W KUPLOMIX has the high refractoriness and the chemical composition necessary to withstand the corrosive action of cupola slags.
- In service H-W KUPLOMIX becomes dense and exceedingly impervious to penetration by destructive slags.
- At cupola operating temperatures, H-W KUPLOMIX develops good strength, making it resistant to impact when charging and to erosion by molten metal and slag.

The nearest Harbison-Walker representative will gladly give you full information about this outstanding cupola lining material.

SIMONDS
ABRASIVE CO.
Grinding Wheels



An ex-PFC ranks high with the "top brass!"

He's now an *operator* first class, and he sure knows the grinding wheels that make his work "come to attention."

They're Simonds Abrasive Company grinding wheels. And they prove themselves in a big way long before he even uses them. Right in Simonds own plant these wheels must satisfy a practical, rough-minded group of department heads that they're *right* for the job . . . grind fast . . . cut cool . . . and keep their shapes.

This insistence on excellence is the reason why Simonds wheels give top rate results on rough grinding, finishing, sharpening, polishing, cutting-off, etc., . . . and why you should know where to get them.

Write for name of your Simonds Abrasive distributor and free data book.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co. Ltd., Arvida, Que.

(*Continued from page* 10)

the hostelry are smarter than most of the hotel managers in the states. It has been a long time since our own hotels have rolled out the plush carpet for the visiting firemen.

—o—

We Have Better Materials: Joseph Gitzen, president, Delta Oil Products Co., Milwaukee, recently returned from an interesting five-week tour of Britain and the Continent. Since Joe loves foundries and foundrymen, it is not surprising that much of his time was spent in foundries where he studied methods, materials and equipment. He was particularly impressed with the foundries he visited in Germany and Switzerland, where production methods were quite modern. Shell molding and production

of nodular iron were noted. While the speed of production was not as great as in our own foundries, the quality of castings was excellent. Joe reports that finishing materials, such as core oil and mold washes, have not been developed as far as in the United States. In some places he observed that tradition is hindering modernization of foundry operations.

—o—

Thanks to Rotary: The *Marshall Rotary Call* recently published by the Rotary Club International of Marshall, Mich., on behalf of the industrial life of the community, features a story on Engineering Castings Inc., one of the foundries of that city. The following paragraph from that article is appreciated greatly: "Indicative of the standing which this company has already attained in its field is the fact that FOUNDRY magazine, the leading monthly publication of the foundry industry, devoted the feature article and the cover of its January, 1952 issue to Engineering Castings Inc." Thanks so much to the Rotary Club of Marshall.

Other industrial organizations described in this issue include: Living-

(*Concluded on page* 14)

COLEMAN TOWER* OVENS

provide maximum production in minimum space

Coleman Tower Ovens, with patented open center, increase oven loading accessibility and improve productivity of coremakers. Labor saving up to 75% is obtained by eliminating trucks, racks and other handling methods. Coleman Tower Ovens use only 25% of the space required for batch-type ovens of the same core capacity.

Coleman Tower Ovens can meet accelerated demands for cores despite limitations of labor and space. Our engineers are available, without obligation, to show you how. Write for Bulletin 48.

Only COLEMAN TOWER OVENS offer all these advantages:

EFFICIENT HANDLING METHODS eliminate delays and losses.

PERFECT CORE BAKING ends manpower and casting losses due to make-overs and rejects.

INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.

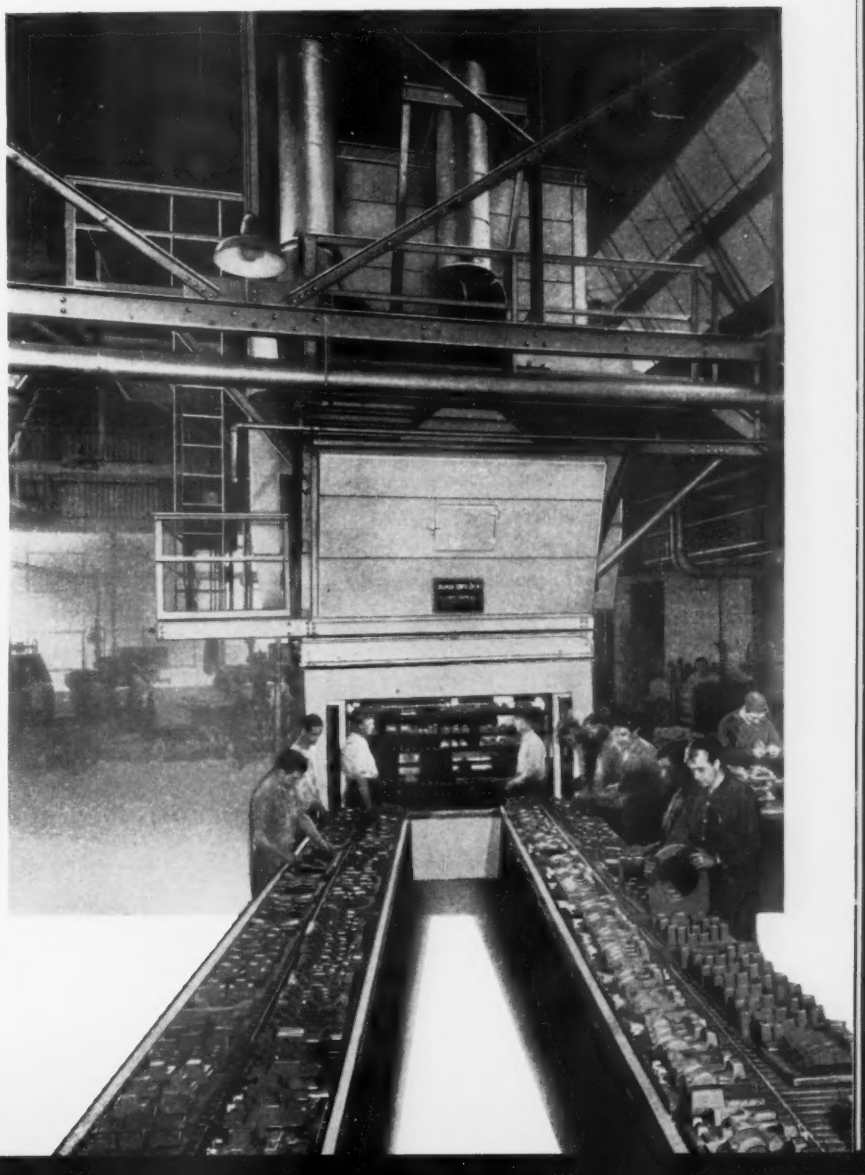
SUPERIOR WORKING CONDITIONS...cores are cooled and smoked-off before leaving oven.

HEAVY DUTY CONSTRUCTION for continuous dependable performance and economical operation.

GREATEST SAVINGS IN FUEL by using the most economical fuel available.

SAVE BINDER. Proper core baking atmosphere and uniform temperature permit important savings in conventional binders.

USE HIGH SPEED CORE BINDERS. Coleman ovens have uniform temperature and accurate control to handle temperature-sensitive resins; pre-baked oils.



*Trademark

A COMPLETE RANGE OF TYPES:

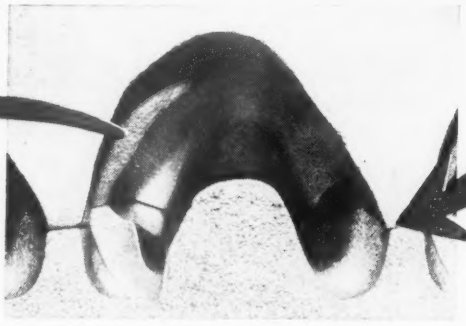
COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

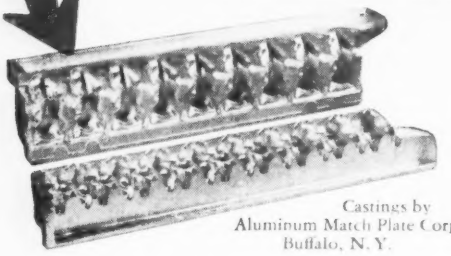
The Foundry Equipment Co.

1831 COLUMBUS ROAD, CLEVELAND 13, OHIO

World's Oldest and Largest Foundry Oven Specialists

For COMPLETE SUCCESS in Shell Molding





Castings by
Aluminum Match Plate Corp.
Buffalo, N. Y.

...use DUREZ RESINS

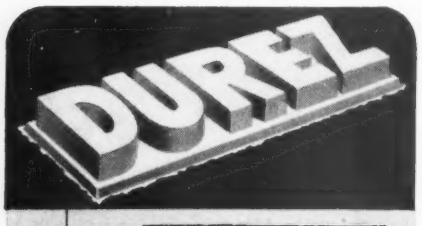
made by
Phenolic Specialists

Thirty-two years of research and production in phenolics exclusively are reflected in the satisfaction obtained by foundries using Durez resins. This experience pays off in results you can measure.

Example of results... Shell molding with a new Durez resin of exceptionally fast cure and rigid set, replaced the conventional method of molding these aluminum castings. Dimensional accuracy of .003" on 16" was obtained. Output increased by 200%. Pattern-like finish with smooth contours and sharp definition of edges permits the castings to be used without clean-up.

On long and short runs, you can obtain the economies in time, space, sand, metal and handling that are inherent in shell molding with Durez resins. We offer you a resin that makes tough, hard shells for excellent general work, special resins for use where specifications require unusually fine castings, and a wetting agent that minimizes dust and segregation.

A cost saving phenolic-type core binder is also now available.



Specialists for 32 years in developing phenolic resins and plastics to meet the needs of industry.

DUREZ PLASTICS & CHEMICALS, INC.
1002 Walck Road, North Tonawanda, N. Y.

OUR ENGINEERING STAFF, experienced in serving foundry men, will gladly aid you in securing the best shells, with or without automatic equipment.

Send Coupon for Full Details!

DUREZ PLASTICS & CHEMICALS, INC.
1002 Walck Road, North Tonawanda, N. Y.

Send me information on the shell molding process.

Name .....

Company .....

Address .....

City and State .....

PHENOLIC RESINS THAT FIT THE JOB

(*Concluded from page* 12)

ston Inc., a foundry which does a sizable business in furnace repair parts; Marshall Foundry, started two years ago by K. J. Hamaker and W. W. Stout; and Boyd Pattern Shop.

—o—

Make it Thirty-Three: Pat Dwyer and Harry Richey are celebrating the 33rd anniversary of the famous "Bill" series with the story appearing in this issue. No other author and illustrator in the field of business journalism have carried on for so long a period. I am sure that many readers join with me in offering congratulations to these veterans of the FOUNDRY staff. The accompanying illustration was taken a few years ago and shows Pat and Harry with two

of the models of the "Bill" story characters which were used in a display at a Foundry Show in Cleveland.

—o—

Stupid Policy: A number of persons have called my attention to an editorial entitled "We Ought To Get Back More Steel Scrap from Overseas," which appears in the Dec. 27, 1952 issue of *The Saturday Evening Post*. They seem to remember that on numerous occasions during the past seven years I have stressed the importance of collecting battlefield and other scrap from the four corners of the globe and returning it to this country as a resource that may be badly needed.

My first comment along that line was made at a conference of the Industrial College of the Armed Forces in 1947, and this has been followed by discussions at Munitions Board committee meetings and through editorial comment in FOUNDRY. Now, with the shipment of metallics to foreign lands continuing and with little interest shown in saving this resource in the form of scrap, the general magazines are pointing out the dangers of our policy of neglect. The *Post* concludes its editorial with the following: "The failure of the MSA authorities to recover overseas scrap material required by our steel industry may prove to be one of the worst blunders of the last decade." To all of this I say, "Amen." May we have enough publicity on this blunder to bring a change in our stupid policy. F.G.S.

Westinghouse saves in excess of $57,000 per year by FORK TRUCK HANDLING

- A fleet of fork trucks including Bakers, coupled with intelligent planning and material handling engineering, enables Westinghouse Electric Corporation to cut handling costs more than $57,000.00 per year at its huge East Pittsburgh works. Savings in which the Baker Trucks participate, include:

- **$12,000.00 warehousing raw materials in the molded materials section**
- **Another $12,000.00 handling finished molded products**
- **$9,000.00 on one scrap handling operation**
- **$7,500 by handling castings on pallets in yard storage**
- **100% added storage capacity in molded materials warehouse**
- **Doubling capacity of drum storage space in yard**

These savings were made possible by replacing manual handling and other slow methods with efficient fork-truck unit-load handling. In some instances Westinghouse devised special pallets and containers to achieve greatest speed and efficiency from their versatile Fork Trucks.

The Complete Story is documented in Baker Case Study Report No. 272. Use this coupon to get your free copy.

Illustrated above is a special stringer pallet which enables Baker Fork Trucks to tier and transport drums four at a time, doubling storage capacity and speeding these operations substantially by eliminating manual methods.

This method of handling scrap saved $9,000.00 in one year. Driver merely operates controls—the truck does the work.

Handling castings in yard storage on pallets with Fork Trucks saves $7500.00 per year over former methods—and multiplies storage capacity by tiering.

By palletizing bagged materials for fork truck handling, tiering to warehouse ceiling more than doubles storage capacity. This method cuts handling costs $12,000.00 per year.

Baker®
INDUSTRIAL TRUCKS

THE BAKER-RAULANG COMPANY
1223 West 80th Street, Cleveland 2, Ohio

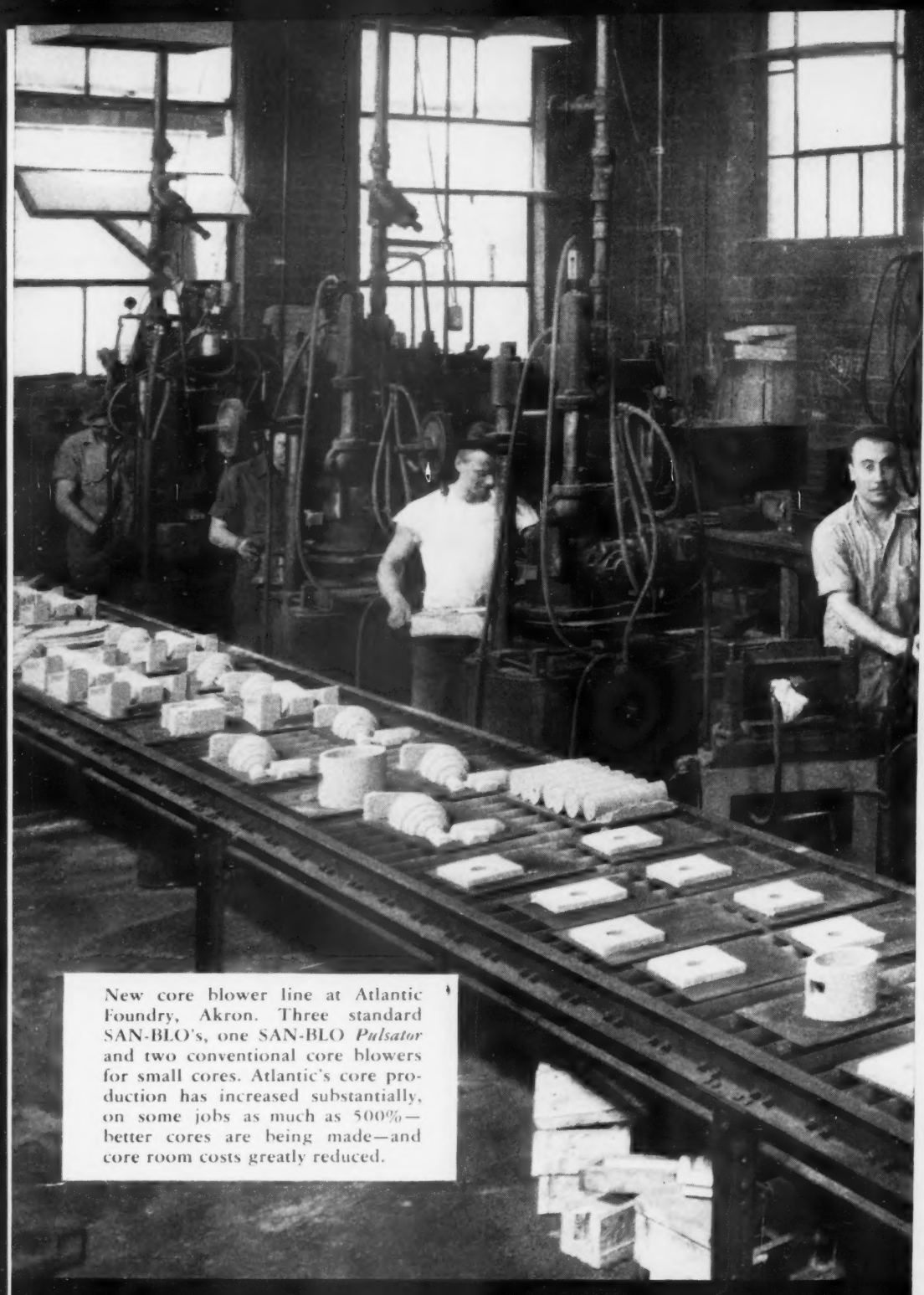
☐ Please send Westinghouse Case Study Report No. 272.
☐ I am also interested in ..... pound capacity trucks.

Name ..... *Title* .....

Company .....

Address .....

City ..... *State* .....

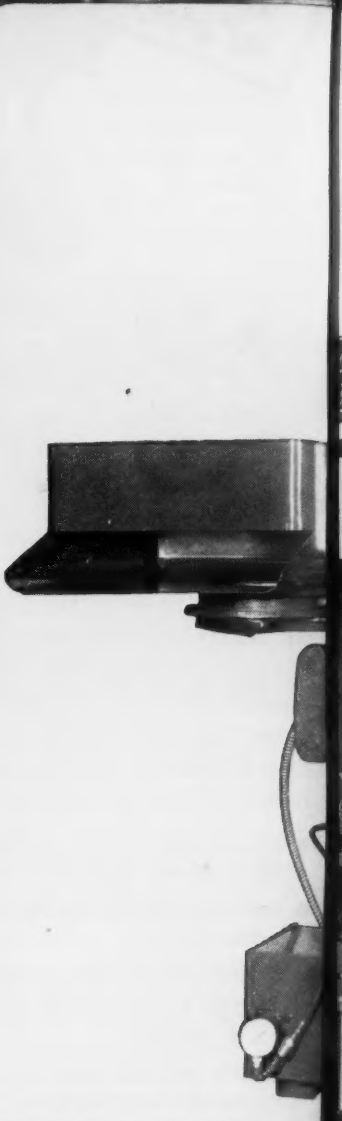


New core blower line at Atlantic Foundry, Akron. Three standard SAN-BLO's, one SAN-BLO *Pulsator* and two conventional core blowers for small cores. Atlantic's core production has increased substantially, on some jobs as much as 500%—better cores are being made—and core room costs greatly reduced.

The SAN-BLO

can give you the core production

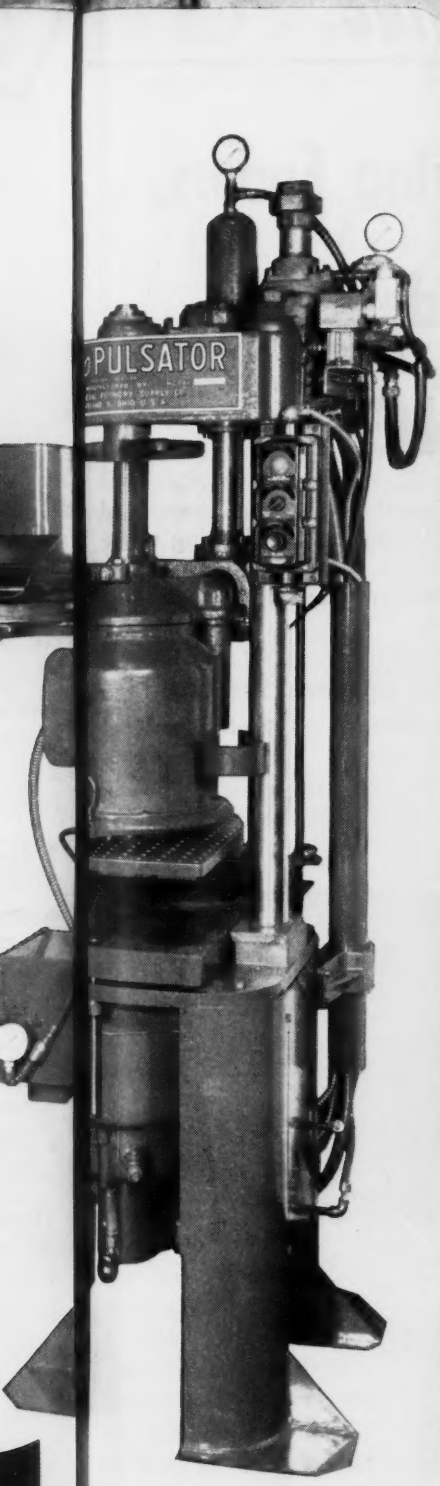
you'd like to have!



SAN-BLO *PULSATOR*
MODEL 40-P-1

For wood and metal core boxes. Single control for clamping, blowing, releasing. Cores to 40 lbs. each. Boxes to 11½" high, 18" wide, 24" long.

FEDERAL



The Pulsator model SAN-BLO is unique among core blowing machines. It can blow any core sand mixture you can ram—blow wooden as well as metal boxes. Quickly adjusted—no time lost changing sand magazine or blow plate. Easy, safe, clean operation. Models for cores weighing up to 250 lbs. Write for full information.

Atlantic's SAN-BLO *Pulsator*. Note wooden core box about to be blown. Finished core from this box in foreground. There isn't a wooden core box at Atlantic (within size limits) that can't be blown on this versatile machine.

FOUNDRY EQUIPMENT MEMBER FEMA MANUFACTURERS ASSOCIATION INC.

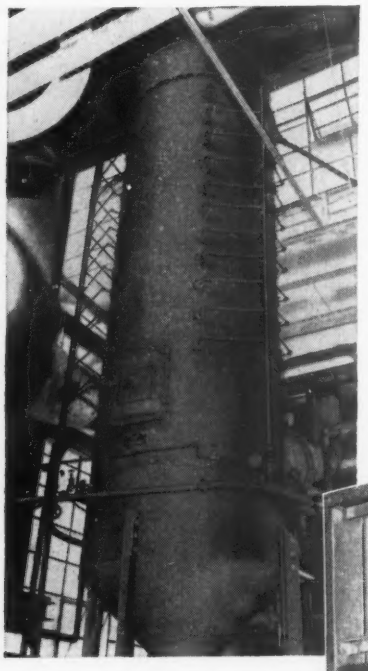
The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

SALES OFFICES: NEW YORK · CLEVELAND · DETROIT · MILWAUKEE · LOS ANGELES

"Buffalo"

Tips on AIR CLEANING



Advantages of Removing Fumes, Dust, Gases, Odors By WET SCRUBBING

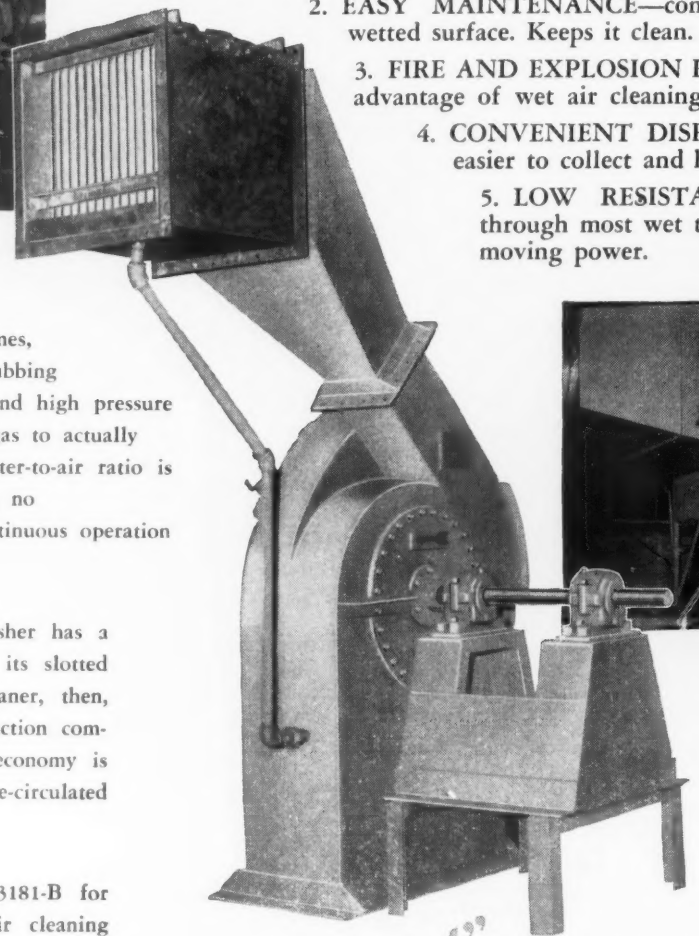
1. DOUBLE ACTION EFFICIENCY—The action of spray particles combined with scrubbing against a wetted surface results in the highest cleaning efficiency.

2. EASY MAINTENANCE—constant scrubbing against a wetted surface. Keeps it clean.

3. FIRE AND EXPLOSION PREVENTION—an obvious advantage of wet air cleaning equipment over dry.

4. CONVENIENT DISPOSAL — wetted material easier to collect and handle.

5. LOW RESISTANCE to passage of air through most wet type units, requiring less air moving power.



Extremely effective in removing fine dusts and fumes, the "Buffalo" Hydraulic Scrubbing Tower has tangential inlet and high pressure spray nozzles which causes gas to actually aspirate through tower. Water-to-air ratio is very low. No moving parts, no baffles or crevices—thus, continuous operation is possible.

"Buffalo" Hydro-Volute Washer has a triple cleaning action: first, its slotted fan scroll acts as a pre-cleaner, then, spray action and scrubbing action complete the cleaning. Water economy is high because water may be re-circulated at low pressure.

WRITE FOR BULLETIN 3181-B for the unit to handle your air cleaning problem—"Buffalo" builds 8 types.

"Buffalo" Air Washers were pioneer air cleaning equipment in industry. Above is a Static Washer with hopper for easy sludge disposal. Other types include Wet Glass Cell Air Washers and rubber-lined fume washers.

"Buffalo" FIRST FOR FANS

DIAMOND JUBILEE 75TH ANNIVERSARY

BUFFALO FORGE COMPANY

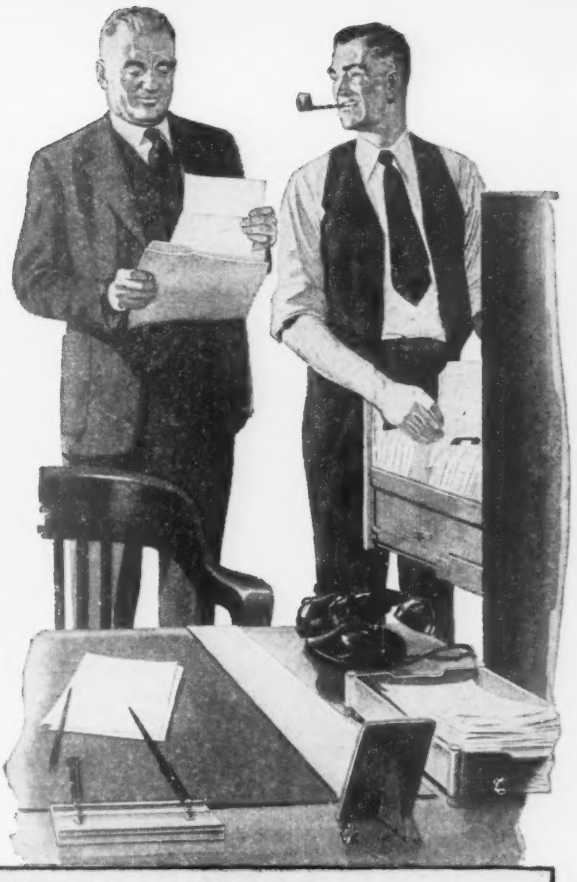
221 MORTIMER ST. BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

VENTILATING | PRESSURE BLOWING | AIR CLEANING | COOLING | AIR TEMPERING | HEATING | INDUCED DRAFT | FORCED DRAFT | EXHAUSTING

How to cut forging costs



ONE GOOD WAY to make *more* forgings at *less* cost is to line your furnaces with B&W Insulating Firebrick.

For example, A. FINKL & SONS—a leading manufacturer of heavy forgings and a pioneer user of B&W Insulating Firebrick—has made appreciable fuel savings with these lightweight brick. What's more, this company found that B&W Insulating Firebrick have given up to 3 years life in their forging furnaces.

The table below shows five other typical records of B&W IFB savings.

COST SAVING DATA ON DROP FORGE FURNACES LINED WITH B&W INSULATING FIREBRICK

Furnace	Type of Forge	Type of Furnace	Controls	B.T.U./lb. Steel		Reduction in cost of Producing Forgings
				Ordinary Firebrick Lining	Insulating Firebrick Lining	
A*	Upset	Slot	Full	4960	1570	$2.27/ton
B	Steam Hammer	Slot	Air–Fuel	6500	3760	$2.16/ton
C	Drop Hammer	Slot	Full	4000	2400	$1.28/ton
D	Steam Hammer	Slot	None	3180	1620	$1.24/ton
E	Steam Hammer	Slot	Full	3500	1400	$1.52/ton

*All furnaces except "A" spring mounted.

Since durable B&W Insulating Firebrick store and conduct less heat, they also assure better temperature and quality control. By reducing cycle time, they make possible higher furnace output. All these advantages are due to B&W's three decades of specialized refractories engineering.

The defense plant expansion program has created unprecedented demands for B&W Insulating Firebrick. It is, therefore, necessary to anticipate your requirements as far in advance as possible.

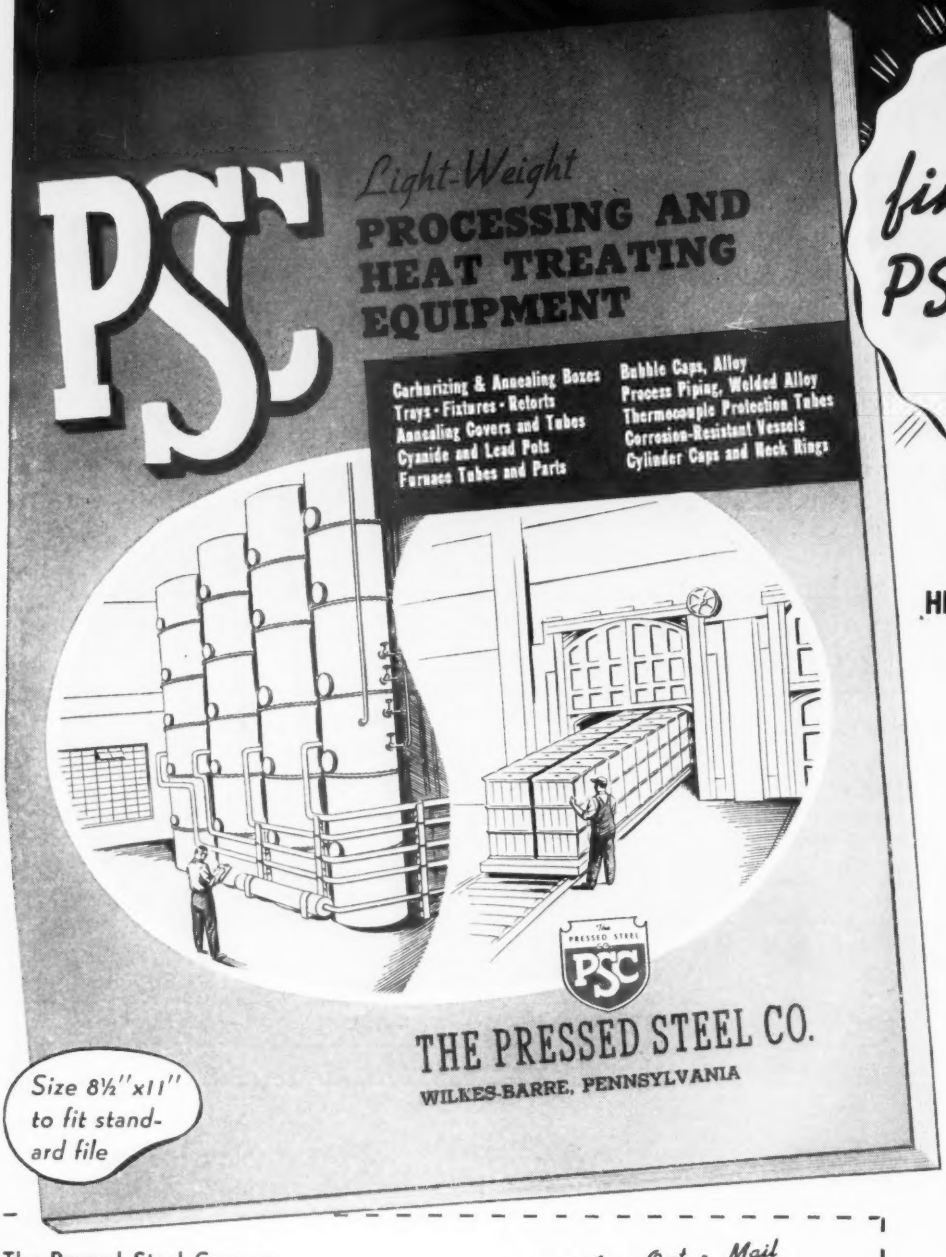
BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R-383

B&W REFRACTORIES PRODUCTS—B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick B&W Refractory Castables, Plastics and Mortars • OTHER B&W PRODUCTS—Stationary & Marine Boilers and Component Equipment... Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

IF YOU USE SHEET ALLOY EQUIPMENT IN ANY OF THESE 30 CLASSIFICATIONS



Size 8½"x11" to fit standard file

You will find the new PSC CATALOG helpful

CLASSIFICATIONS OF PSC HEAT AND CORROSION-RESISTANT INDUSTRIAL EQUIPMENT

Baskets, annealing & carburizing
Baskets, cyanide dipping
Baskets, pickling
Bends, alloy pipe & tubing (welding)
Boxes, annealing & carburizing
Caps, bubble (fractionating tower & still)
Caps, cylinder (compressed gas)
Covers, annealing (Bell furnace)
Covers, annealing (elevator furnace)
Fixtures, carburizing
Flights, conveyor (syn. rubber plant)
Headers, air pre-heating
Manifolds, gas exhaust
Muffles, carburizing
Piping, process (alloy only)
Pots, carburizing & annealing
Pots: lead, cyanide & salt
Racks, annealing & carburizing
Racks, sheet pickling
Retorts, carburizing
Rings, neck (compressed gas cylinder)
Tanks, copper annealing
Tanks, pickling
Trays, annealing & brazing
Tubes, annealing
Tubes, furnace vent
Tubes, radiant furnace
Tubes, thermocouple protection
Tubing, corrosion & heat resistant
Tubing Assemblies, welded alloy

The Pressed Steel Company
712 N. Penna. Ave., Wilkes-Barre, Pa.

Sign • Tear Out • Mail

Send us a copy of your catalog on welded alloy equipment for heat-treating, oil refining, and processing of chemicals, drugs, foods, etc.

Name.....

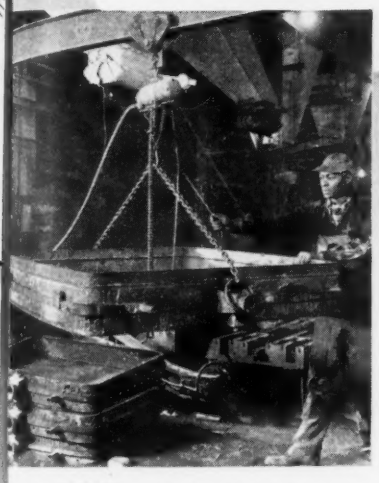
Company.....

Address.....

INDUSTRIAL EQUIPMENT OF HEAT AND CORROSION-RESISTANT SHEET ALLOYS

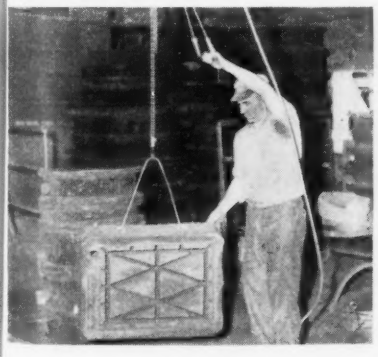
UP THE LADDER

Weighs only 30 lb ... one man handles it easily



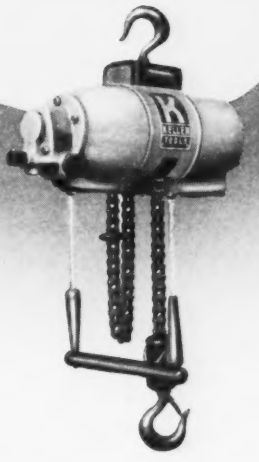
ABOVE: *Moving side section of a large flask.*

BELOW: *Handling a sand core.*



...AND DOWN

It is as easy as that to move a Keller Air Hoist from one place to another



A Keller Pneumatic Hoist seldom needs service. But if it does, one man can make replacement in a few minutes—avoiding the delay and "down time" that sometimes keeps whole departments idle for half an hour or more.

LIGHT WEIGHT—300 and 1,000 lb capacity Hoists weigh 30 lb; 1-ton model weighs 75 lb

VARIABLE SPEED with finger-tip control permits accurate handling and spotting of fragile loads

CONTINUOUS DUTY air motor permits hoist to be used without interruption hour after hour

DUST, FUMES cannot injure an air motor, or affect its service

CANNOT BURN OUT even if stalled all day long!

LOW MAINTENANCE because of simple, rugged construction

KELLER
Air Hoists
IDEAL FOR ROUGH TOUGH FOUNDRY JOBS

KELLER TOOL CO., 4520 Race St., Grand Haven, Mich.

Please send me illustrated literature and prices of Keller Air Hoists.

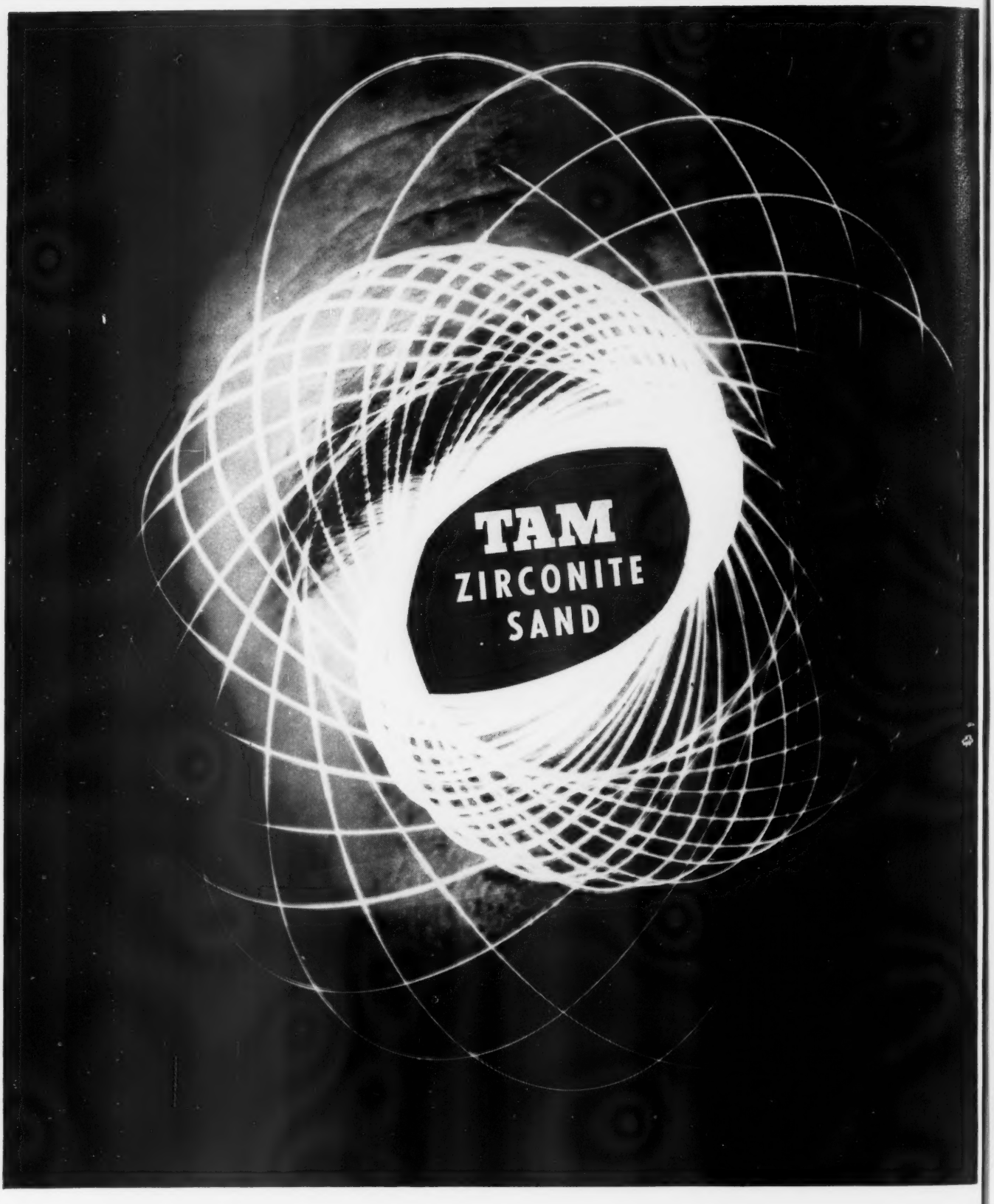
Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____



CUTS CLEANING COSTS TO THE BONE . . . Because of its high fusion point . . . (well above 4000°F) TAM ZIRCONITE SAND ends burning-in and metal penetration of cores and molds. Easier shake-outs are promoted. These and other advantages will make it worthwhile for you to get detailed facts from our New York City office.

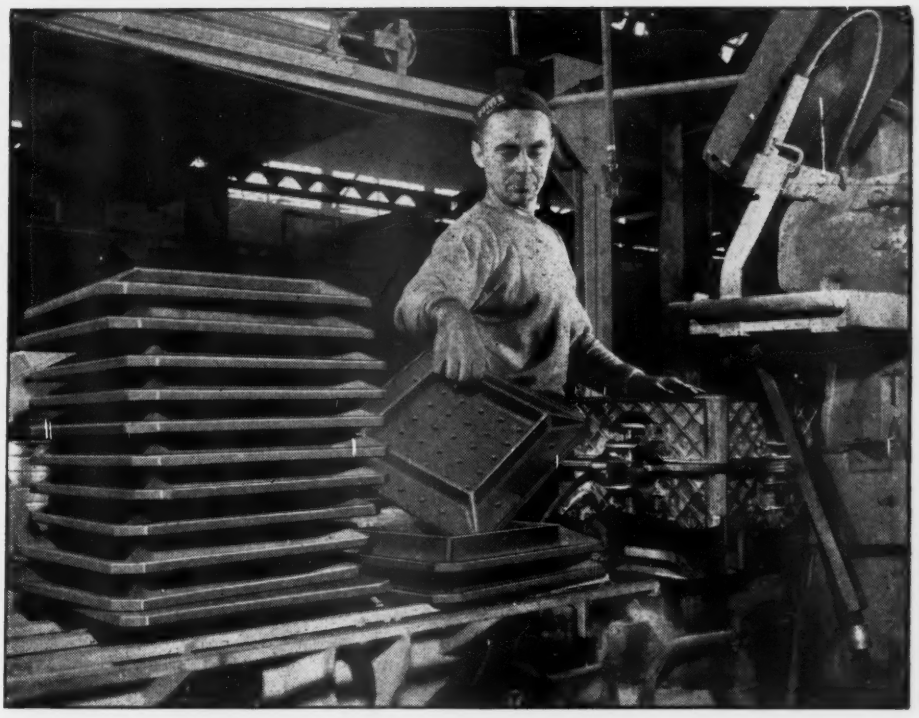
*TAM and ZIRCONITE are registered trademarks.

TAM PRODUCTS
Registered U. S. Pat. Off.

TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY
Executive and Sales Offices: 111 BROADWAY, NEW YORK CITY
General Offices, Works and Research Laboratories: NIAGARA FALLS, N. Y.

"Burning and Breakage loss not a factor since using EDCO Dowmetal BOTTOM BOARDS"

...says Olney Foundry, LINK-BELT COMPANY, Philadelphia, Pa.



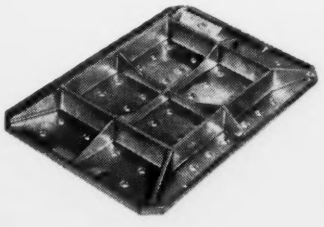
Modern mechanized foundries, like Olney Foundry, rely on the durability of EDCO DOWMETAL Bottom Boards. Even after 3 years of constant use, the EDCO DOWMETAL Bottom Boards at Olney Foundry continue to give maximum production efficiency. That's why Olney Foundry says with confidence: "Burning and breakage loss not a factor since using EDCO DOWMETAL Bottom Boards".

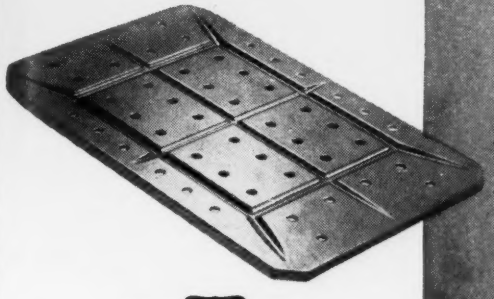
EDCO DOWMETAL Bottom Boards also help produce castings that are true to pattern. The exclusive grooved and vented design permits escape of gasses, and insures mold stability. Causes for rejects are kept to a minimum.

"EDCO DOWMETAL Bottom Boards are now permanent equipment in our foundry", adds Olney Foundry. "They help increase output while cutting production costs, and have more than paid for themselves in savings alone effected by substantially reduced replacement costs."

Regardless of the size of your foundry operation, your molders will like handling these boards because they are strong—yet light in weight, easy to stack, and do not splinter. EDCO DOWMETAL Bottom Boards will not warp or rot—there are no nails to come out, nothing to break or split—no upkeep.

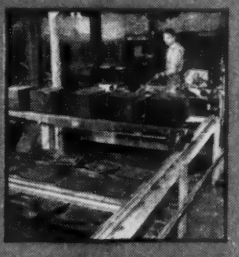
Write us, or phone CApitol 7-2060 for price schedule and list of 74 standard sizes available from stock.





Olney Foundry was established in 1920 as a division of Link-Belt Company in Philadelphia, Pa. Olney Foundry produces gray iron castings of every description ranging in size from a few ounces to ten tons in weight. EDCO DOWMETAL Bottom Boards have been extremely helpful in maintaining the high degree of modern mechanization characteristic of Olney Foundry.

The illustrations at right show some of the foundry production equipment used by Olney Foundry to achieve their high degree of modern mechanization. The pallet-type gravity conveyor in the top panel shows molds on EDCO DOWMETAL Bottom Boards being moved to the pouring area. This pouring area is shown in the lower panel. The molds are automatically dumped after pouring and the EDCO DOWMETAL Bottom Boards are returned by the conveyor to the molder.



EDCO CHRISTIANSEN CORPORATION

CHRISTIANSEN CORPORATION

1517 N. KILPATRICK AVE. • CHICAGO 51, ILLINOIS

ALUMINUM ALLOY INGOTS • ZINC BASE DIE CASTING ALLOYS

DU

ABILITY

Protected by their peculiar shell armor and possessing an extraordinary immunity to disease, Giant Turtles often live to extremely old age. Without question, they are the most durable of all creatures.

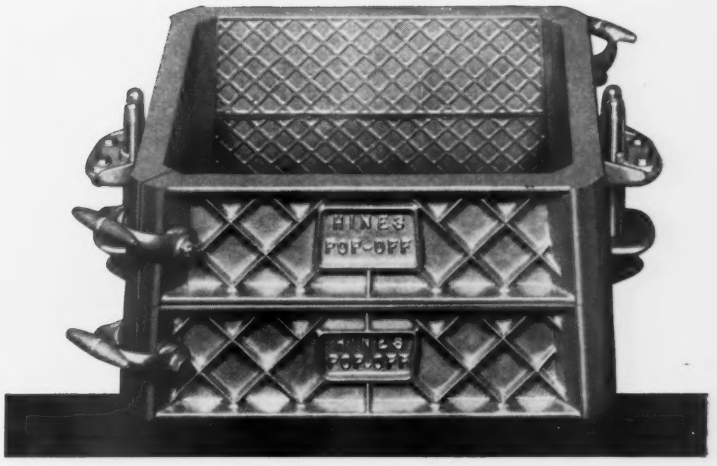
HINES FLASKS, too, can lay claim to records in durability. For over thirty years, HINES has been making foundry flasks and jackets exclusively — building better flasks, for longer service. HINES FLASKS are fixture-built to extreme accuracy, reinforced at the parting line and strengthened with diagonal ribs. Furthermore, their exclusive "Pop-Off" feature permits easy removal from the mold, *without hammering.*

You can depend on HINES FLASKS to give better service and longer life than any flask you've ever used. So, next time you're in need of flasks, or jackets, get in touch with HINES.

HINES FLASKS

HINES POP-OFF FLASK

The matter of age in turtles is one that has excited considerable public interest and, unfortunately, one that has led to many exaggerations. Reports of turtles living 500 or more years are untrue. Nevertheless, turtles do enjoy extremely long life. The record is held by an "Old World" tortoise—scientifically verified to have lived 177 years. A pretty durable old fellow, when you figure he was born prior to the signing of our Declaration of Independence.



The Hines Flask Co., 3431 West 140th Street, Cleveland 11, Ohio • Telephone: ORchard 1-2806

the hole story of HA efficiency

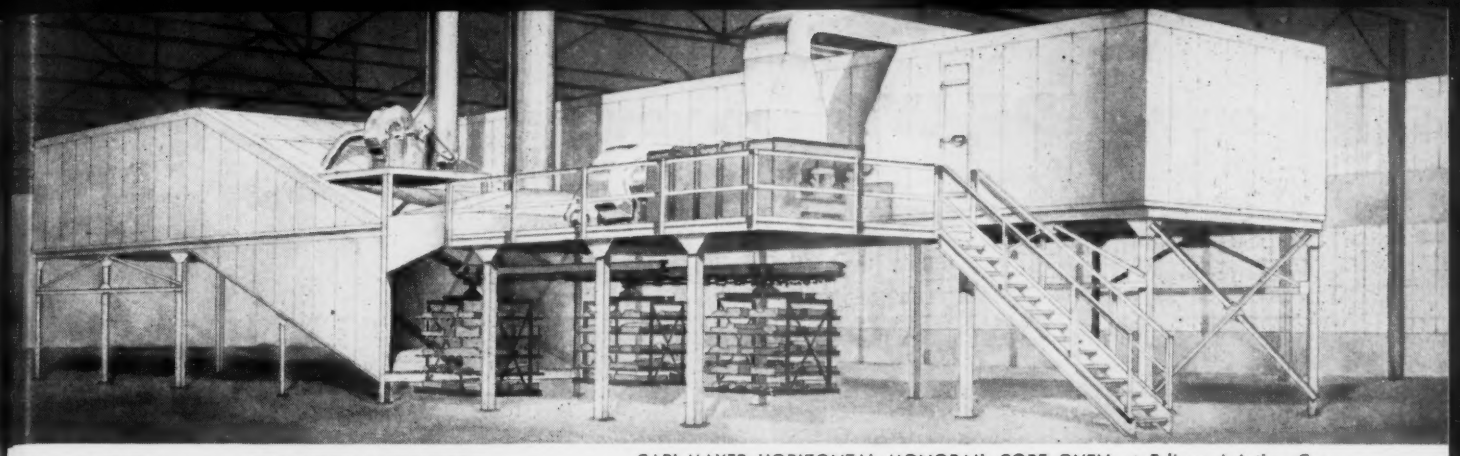
EACH opening in the HA air cylinder has been plotted to fill your lines with extra cubic feet of air for every power dollar. Some holes take the free-flowing compressor valves. Some admit water to the effective cooling jacket. Other openings hold regulators that keep the HA in step with your air demands. Get the whole story today. Send for Bulletin HAC-36.

SINCE 1859

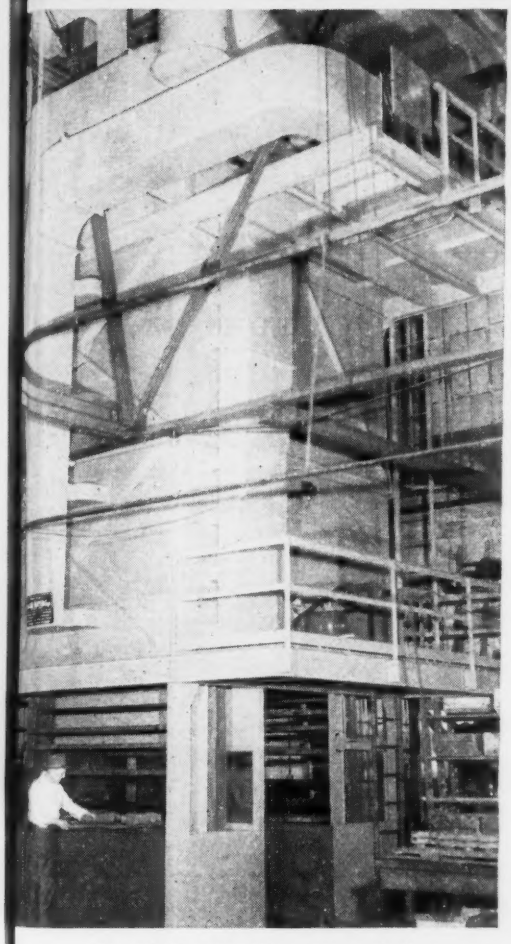
GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd.,
14 Curity Ave., Toronto 13, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS



CARL-MAYER HORIZONTAL MONORAIL CORE OVEN at Eclipse Aviation Co.
Patent No. 2355814

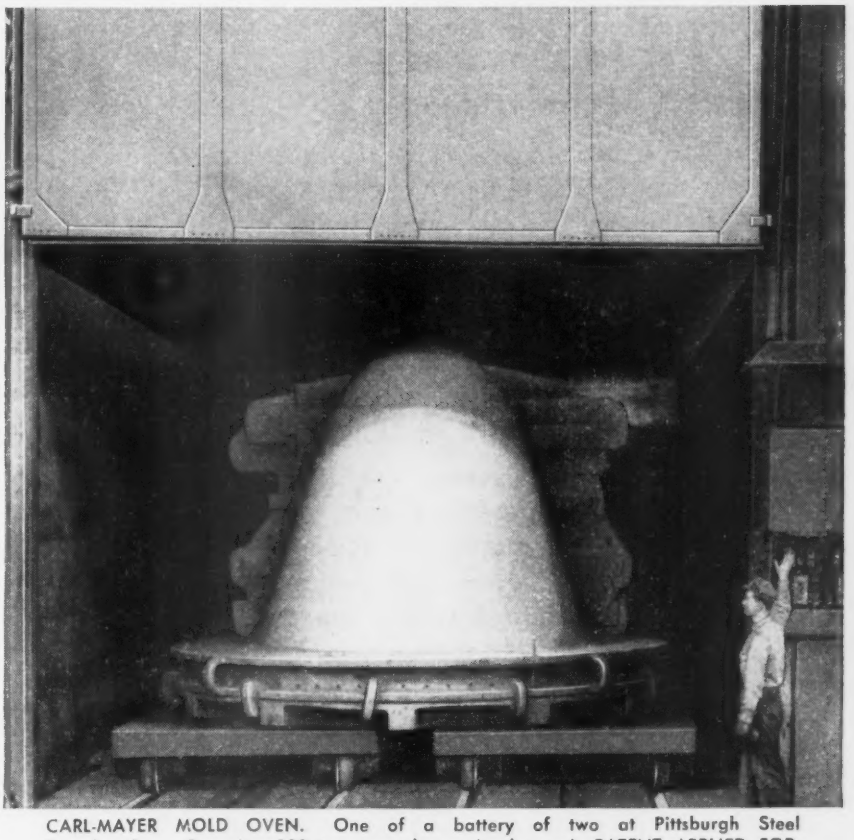


CARL-MAYER VERTICAL CORE OVEN
at G. & C. Foundry Company
Patent No. 2257180.

"BIG" Engineering brings big foundry oven jobs to CARL-MAYER

Carl-Mayer designs embody patented features which contribute to highest efficiency and economy in operation. It will pay you to consult us on your next core baking and mold drying problem. We build ovens of all types and sizes, also other types of industrial ovens and furnaces.

Write For Bulletin No. 53-CM.



CARL-MAYER MOLD OVEN. One of a battery of two at Pittsburgh Steel Foundry Corp. Capacity: 100 tons per charge (each oven). PATENT APPLIED FOR.

ARL-MAYER CORE AND MOLD OVENS ARE SERVING CONCERNS LIKE THESE:

inum Co. of America
ican Brake Shoe Co.
ican Radiator Co.
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n Industries
Motor Div. of General tors Corp.
us-Erie Co.
lac Motor Div. of Gen- al Motors Corp.
bia Steel Corp.
S. Steel Corp.)
ble Steel Castings Co.
rk Radiator Co.
e Aviation Division of dix Aviation Corp
ic Autolite Co.
Motor Co.
nt Foundry Co.
C. Foundry Co.
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Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
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Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

THE CARL-MAYER CORP.

3030 Euclid Ave., Cleveland, Ohio

Backed by reputation and over 30 years' experience

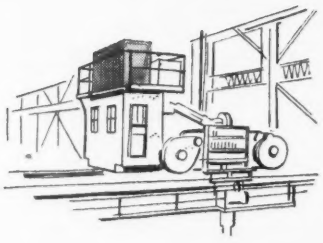
only at **DRAVO** can you get . . .

a **COMPLETE LINE** of

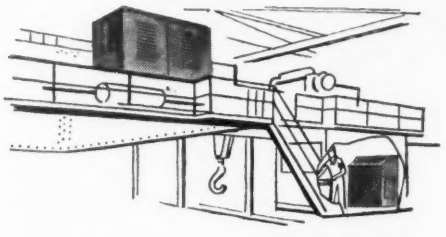
CRANE CAB COOLERS AND CONDITIONERS

No matter what radical temperature variations or atmospheric conditions occur in your industry, there's a Dravo Crane Cab Cooler or Conditioner available to protect your crane cab operator, safeguard his health, increase his efficiency and alertness and improve safety and production records in your operations.

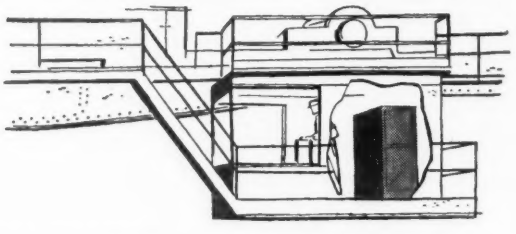
Dravo Crane Cab Coolers and Conditioners provide complete air conditioning, filter the air, remove dusts, dirt and fumes; heat the cab in winter, cool it in summer and provide constant ventilation the year around.



SELF-CONTAINED COOLERS—mounted alongside the cab or on the cab roof. Only electrical leads and connections required. Thermostat control—fully automatic—maintains 85° F. temperature with ambient temperatures up to 175° F. Ideal for "hot spots" in steel and other metal-working industries.



SPLIT-TYPE COOLERS—installed on the crane in two sections—the heavy condenser unit *on the crane* wherever you want it—the light cooling section *in the cab* with the operator. Two sections joined only with refrigerant pipe and electrical connections.



SMALL HEATERS AND VENTILATORS—especially designed to filter dusts and dirt, remove fumes, provide constant ventilation, supply heat in winter. Ideal for cranes in quarrying, slag, cement and similar industries.

One Source of Supply— Easy Installation

Dravo is your *one source of supply* for all crane cab coolers and conditioners. Units are quickly and easily installed with a minimum of downtime required. Parts are interchangeable on all units.

Available for Immediate Delivery

No delays in getting the units you want. For more information write for a complete catalog—or phone your nearest Dravo sales office and have our representative call on you.

DRAVO

DRAVO

CORPORATION

609 Dravo Building, Fifth and Liberty Avenues, Pittsburgh 22, Pa.

ATLANTA • BOSTON • CHICAGO • CLEVELAND • DETROIT • NEW YORK • PHILADELPHIA • PITTSBURGH

FLOORSTAND GRINDING . . . Whether you are grinding bronze castings like this worm or one of the other non-ferrous metals you can be sure of obtaining a Norton wheel of the correct abrasive, bond, grain, grade and treatment for minimum grinding costs.

PORTABLE GRINDING . . . can be done with tiny Norton mounted points in the hard-to-get-at places or with husky cup wheels on jobs like this bronze propeller. But on any job you'll like the way Norton wheels cut fast and hug the work.

CUTTING GATES AND RISERS . . . is quick and easy with Norton BN wheels whether you use this type of grinder or a swing frame. The BN wheel is sturdy but flexible for maximum resistance to breakage — also it's fast cutting and long lived.

Here's the real "TOUCH OF GOLD" for your soft-metal grinding

You get grinding that improves product quality and cuts costs — you get the real "Touch of Gold" — when you have Norton wheels working for you. A Norton grinding wheel *adds to the value of everything* it touches.

For your non-ferrous grinding, in particular, Norton CRYSTOLON* wheels are the best you can get for any low speed machine. They last long, but not *too* long. They wear at the right rate for the work.

For your high speed machines, Norton ALUNDUM* wheels are unbeatable. Sharp cutting and cool running, they're the wheels to use when you grind fast.

Your Norton Distributor

can supply you with the *right* Norton wheels. See him, or write to Norton Company, Worcester 6, Mass. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES

Making better products to make other products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

mammoth castings

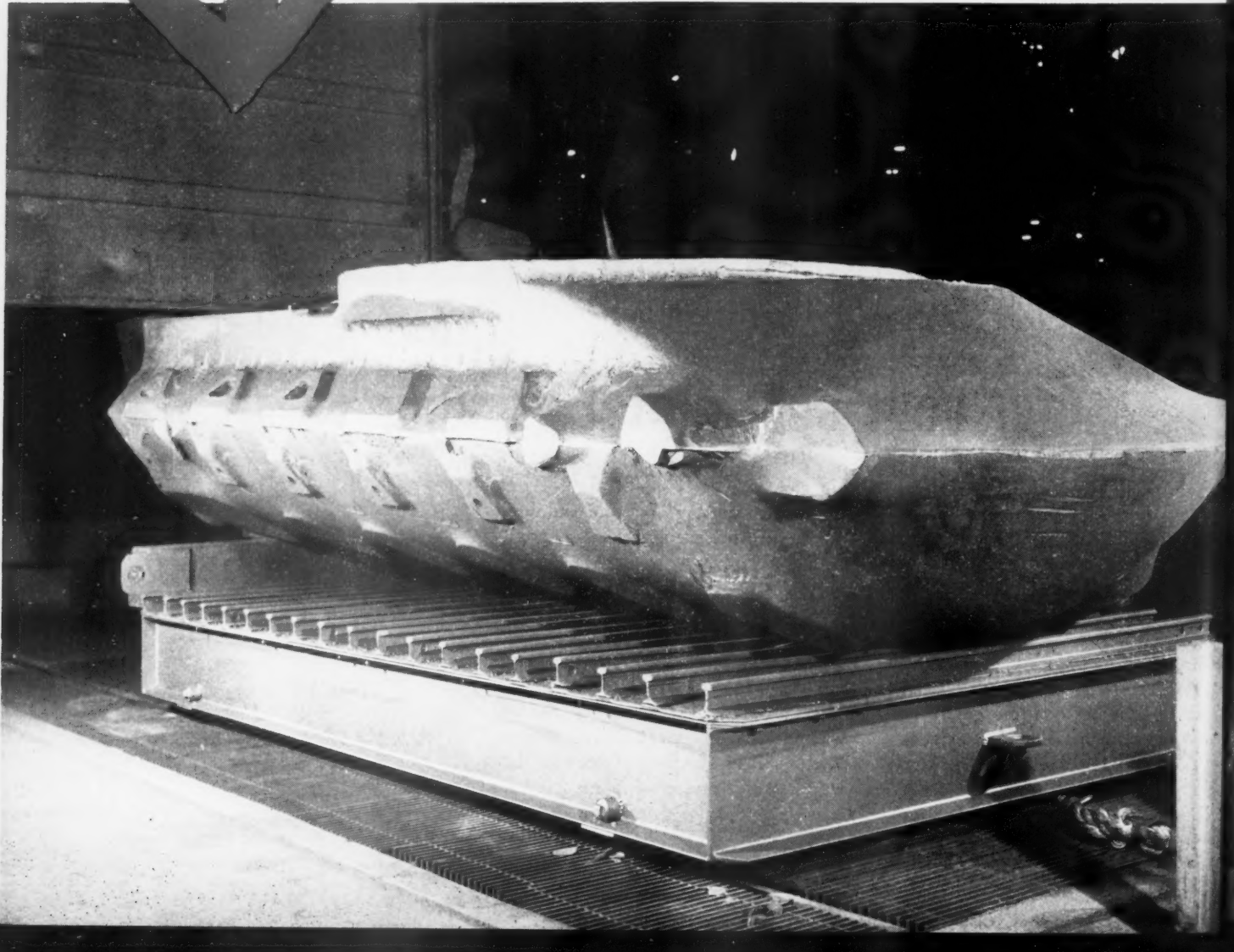
cleaned in 40 minutes with a

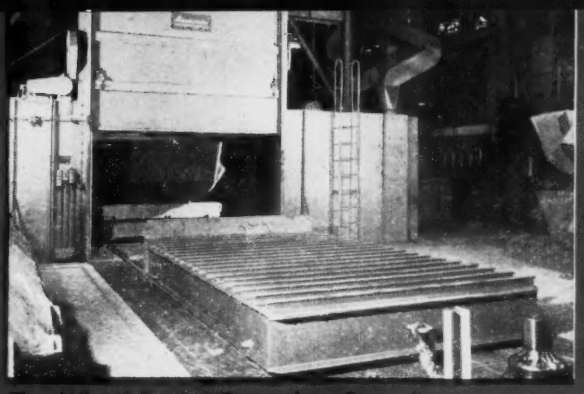
wheelabrator® room

Could you clean this mammoth cast steel tank hull in just 40 minutes? That's all it takes in the giant Wheelabrator Room, the world's largest airless abrasive blast cabinet ever built, installed in the ordnance division of a large steel foundry*. To do this same job by air blasting would require 7 to 9 hours per casting using two operators. Savings effected by this installation are tremendous—in original equipment, labor requirements, floor space, compressed air costs, etc. A smaller Wheelabrator Room is used for cleaning smaller tank castings.

You, too, can solve the problem of cleaning large bulky and unwieldly castings with a cost-saving Wheelabrator Room. Write today for Catalog 854.

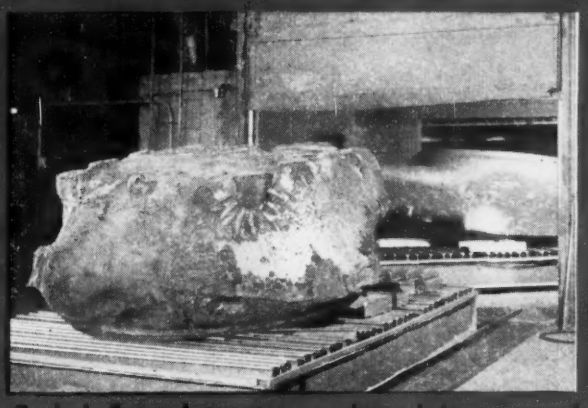
**A similar machine for the same application has recently been installed in another steel foundry.*





The Wheelabrator Room has 2 work cars, one at each end. As one is removed for unloading, the other is simultaneously pulled into the blasting zone.

Interior of the Wheelabrator Room with the tank hull casting in blasting position. Nine blast units are utilized for thorough abrasive coverage.



Tank hulls and turrets are cleaned in a second 5-wheel Wheelabrator Room. Casting shown before Wheelabrating.

Tank turret casting after cleaning. Castings this size are cleaned in 16 to 24 minutes compared to 8 man hours by air blasting.

wheelabrating *has unlimited applications*

Wheelabrator airless blast cleaning is the fastest, most versatile cleaning process in use today. The Airless Wheelabrator blast unit perfected by *American,* throws more abrasive and throws it harder per horsepower expended than any other blasting device ever conceived. This Wheelabrator unit is utilized to its highest degree of efficiency by incorporating it in a complete line of equipment noted for its production speed, cleaning efficiency and low cost operation.

By adapting the Wheelabrator to various machines such as Tumblasts, Tables, and Cabinets engineered for special applications, an almost endless variety of cleaning problems have been solved. The engineering leadership that has made Wheelabrator the leader in the field is an important point to remember when your cleaning operations require improvement. For expert counsel and the right equipment for the job bring your problems to us.

The bulletins below show how the Wheelabrator pays for itself quickly through savings effected for various types of foundries. Write for the bulletin of your choice today.

CLEANING PROBLEMS SOLVED IN . . .

Non-Ferrous Foundries | Malleable Foundries | Steel Foundries | Gray Iron Foundries

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC.

THE AMERICAN MOLDER TRADE MARK REG. U.S. PAT. OFF.

American

WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit St., Mishawaka, Ind.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

IT'S *Actually* THE MULTIPLE WASHING ACTION THAT MAKES THE MULTI-WASH *so efficient!*

The Schneible patented Vari-vane construction gives the *extra* washing action that makes Multi-Wash dust control systems outstanding in efficiency and low cost operation.

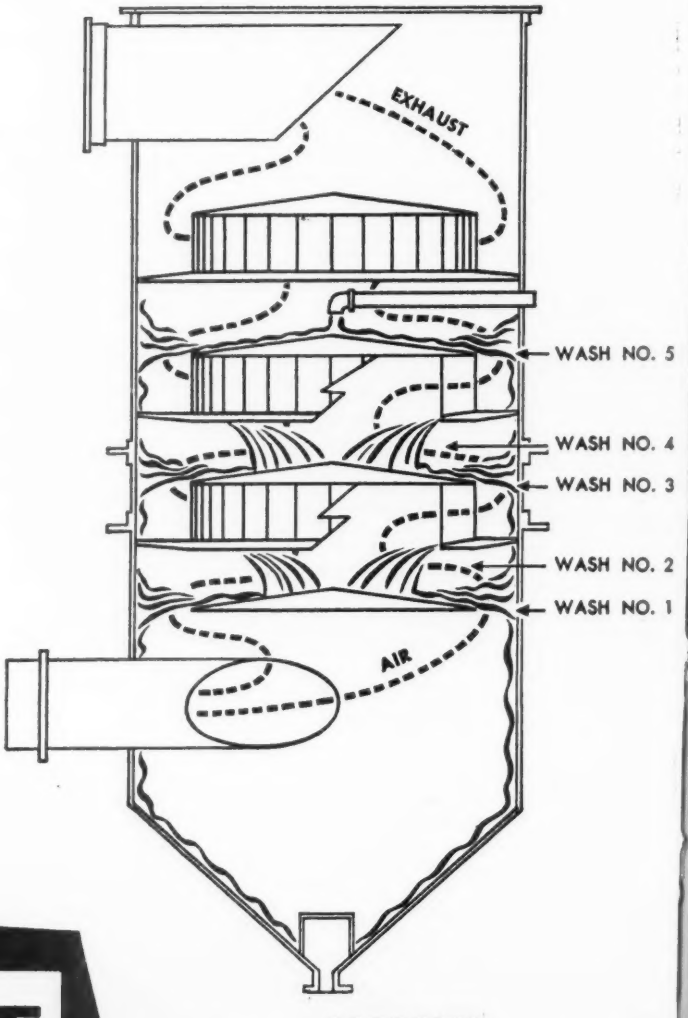
The cutaway diagram shows a type JC—2½ stage collector. Each impingement stage provides two washes of incoming dust-laden air, plus one at the bottom deflector plate, or five separate washes. This thorough scrubbing removes ordinary dust particles down to the two micron range, which drop to the sludge cone and then go to the dewatering tank.

For each impingement stage that is added, two extra washes are provided, increasing the efficiency and allowing the collection of finer particles down to sub-micron ranges.

It's easy to see why Multi-Wash is preferred by foundrymen who insist on the utmost in efficiency with lowest maintenance cost!

Your local Schneible representative can help you provide better dust control, or write direct for complete information.

Cross-section diagram of type JC Multi-Wash collector showing 5 points of washing action. The type IC with 4½ impingement stages provides 9 washes while the HC with 6½ stages gives a total of 13 washes for removal of extremely fine particles.



SCHNEIBLE

PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

CLAUDE B. SCHNEIBLE COMPANY • P. O. BOX 81, NORTH END STATION • DETROIT 2, MICHIGAN

Late Foundry News

January 26, 1953

CASTING PRICES UP: Office of Price Stabilization has authorized increases in ceiling prices of 9 per cent on gray iron castings and 5 per cent on carbon and low-alloy steel castings. These were effective Jan. 2. Effective Jan. 23 a 3½ per cent increase was authorized on high-alloy steel castings. Action on an industry-requested increase in nonferrous casting ceilings reportedly has been delayed by the slowness with which individual companies responded to the call for data on which OPS is to base its decision. However, it is understood that sufficient information now is at hand for OPS to proceed, and some decision is expected to be reached early in February. In other price actions OPS ruled that cast rolling mill rolls and ingot molds and stools must be priced under the regulation applying to castings—CPR 60.

SHELL MOLDING GROWS: Total production of phenolic resins for shell molding use is expected to be nearly quadrupled this year, according to Robert K. Mueller, general manager, Monsanto Chemical Co.'s Plastics Division. He stated that shell making machines having a total of about 300 stations were operated last year; by the end of 1953 this figure should be tripled. Backlogs of machinery manufacturers are said to extend three to six months, occasioning some delay in foundries' getting into production.

FEWER INJURIES: Foundries reduced their average accident rates the first nine months of 1952 compared with the year before, the U. S. Department of Labor reports. Gray iron and malleable foundries cut their rate from 39.6 to 32.2, steel foundries dropped from 32 to 26.9, and nonferrous foundries from 24.5 to 21.2. By comparison, however, the record remains poor. The accident rate for blast furnaces and steel mills was only 6.2; that for the automotive industry was 5.1, and the average for all manufacturing was 13.8.

FOUNDRY EXPANSION: Accelerated tax amortization for new or expanded plant facilities has been approved for the following foundries in the amounts indicated: Adirondack Foundries & Steel Inc., Watervliet, N. Y., $48,000; Griffin Wheel Co., Chicago, $850,750; Locomotive Finished Material Co., Atchison, Kans., $162,687; Derbyshire Steel Co. Inc., El Paso, Tex., $95,894; General Motors Corp., Saginaw, Mich., $220,364; Ross Valve Mfg. Co., Troy, N. Y., $105,245; U. S. Pipe & Foundry Co., Burlington, N. J., $793,480; Bagley & Sewell Co., Watertown, N. Y., $214,201; General Motors Corp., Danville, Ill., $202,163; Consolidated Iron - Steel Mfg. Co., Cleveland, $26,506; Fahralloy Co., Harvey, Ill., $19,697.

STEEL FOUNDERS ELECT: A. J. McDonald, vice president, American Steel Foundries, Washington, has been elected president of the Steel Founders' Society of America. Re-elected were: Vice president, C. F. Barchfeld, Commercial Steel Casting Co., Marion, O.; treasurer, R. G. Parks, National Malleable & Steel Castings Co., Cleveland: executive committee member, A. S. Breithaupt, Dodge Steel Co., Philadelphia; executive vice president, F. Kermit Donaldson; technical and research director, Charles W. Briggs.

NEW CASTING SOCIETY: Foundries using the precision investment casting process met in Cleveland recently to organize a trade and technical society. Kenneth M. Bartlett, manager, Metallurgical Products Division, Thompson Products Inc., Cleveland, was appointed temporary chairman.

BENTONITE BOOM: Bureau of Mines reports that 1951 was a record year in bentonite production—1,218,863 tons and 25 per cent ahead of 1950. Foundries accounted for 23 per cent of total consumption while most of the remainder was used by the petroleum industry.

LULL MFG. CORP. SOLD: Baker-Raulang Co., Cleveland, builder of lift trucks, tractors and cranes, has bought the Lull Mfg. Corp., Minneapolis. The latter produces heavy-duty lift trucks and front-end loading tractors. The new subsidiary will be known as the Baker-Lull Corp.

SMALL BUSINESS AID: A leaflet, "Two Dozen Ideas for Effective Administration," has been issued by the Small Defense Plants Administration and is available from SDPA field offices. One of a series, it offers 24 specific proposals intended to provide the small businessman a more effective staff.

AFS NOMINEES: Collins L. Carter, president, Albion Malleable Iron Co., Albion, Mich., and vice president of the American Foundrymen's Society,

has been nominated as AFS president for 1953-54. Vice presidential nominee is Frank J. Dost, president, Sterling Foundry Co., Wellington, O. Directors nominated for three-year terms are: E. C. Hoenicke, Foundry Division, Eaton Mfg. Co., Detroit; Martin J. Lefler, Oliver Corp., South Bend, Ind.; C. V. Nass, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago; Victor F. Stine, Pangborn Corp., Hagerstown, Md., and G. Ewing Tait, Dominion Engineering Works Ltd., Montreal. The nominees are subject to election at the AFS annual convention in Chicago, May 4-8.

MALLEABLE CONFERENCE: Annual Market Development Conference of the Malleable Founders' Society will be held at Illinois Institute of Technology, Chicago, Apr. 9-10. Consideration of various aspects of the problem of developing new business will include a discussion of commercial possibilities of shell mold castings.

CRITICAL MATERIALS: Gray iron and steel castings over 3000 pounds in weight are the principal foundry products remaining in the "short supply" classification prepared by the DPA Conservation Division. High-alloy steel castings also are in this grouping. Light-weight carbon and low-alloy steel castings are listed in approximate supply-demand balance, while malleable iron and light-weight gray iron castings continue in fair to good supply.

MISCELLANY: Beehive coke producers have been authorized by OPS to increase their prices an average of 6 per cent . . . Domestic wholesale distributors of primary nickel are allowed a price increase of 3½ cents a pound because they now are required to buy their requirements in Canada . . . Richmond Malleable Castings Co., Richmond, Ind., and General Metals Corp., Oakland, Calif., have completed a year with no lost-time accidents . . . Horace M. Bringhurst is new director of the Coke Division, Defense Solid Fuels Administration, Department of the Interior. For a number of years he directed foundry coke sales at Detroit for Semet-Solvay Division, Allied Chemical & Dye Corp. . . . In line with the reduction in personnel attached to the Metalworking Equipment Division of NPA, George P. Fisher has left as acting chief of the Foundry Equipment Section.

PRICES OF FOUNDRY METALS AND COKE

(As of Jan. 26, 1953)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50-17.50
New River	20.80
Wise County	15.95
OVEN	
Birmingham	$21.65
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Everett, Mass.	26.05
Indianapolis	24.25
Kearney, N. J.	24.00
Milwaukee	25.25
Painesville, O.	25.50
Philadelphia	23.95
Portsmouth, O.	24.00
St. Louis	26.00
Swedeland, Pa.	23.85
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$57.00	$57.50
Birmingham	51.38	....
Buffalo	55.00	55.50
Chicago	55.00	55.00
Cleveland	55.00	55.00
Everett, Mass.	59.25	59.75
Fontana, Calif.	61.00	....
Geneva, Utah	55.00	....
Granite City, Ill.	56.90	57.40
Lone Star, Tex.	51.00	51.00
Neville Island (Pittsburgh)	55.00	55.00
Steelton, Pa.	57.00	57.50
Swedeland, Pa.	59.00	59.50
Toledo, O.	55.00	55.00
Troy, N. Y.	57.00	57.50
Youngstown, O.	55.00	55.00

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5—27.25c; 88-10-2—40.00c; 80-10-10 — 33.00c; No. 1 yellow — 23.25c.

ALUMINUM: 99 per cent plus, primary ingots 20.00c. Secondary No. 12 alloy 19.50c. Deoxidizing grades: No. 1 18.80c; No. 4 18.20c.

MAGNESIUM: 99.8 per cent standard ingots 24.50c, f.o.b. Freeport, Tex.

COPPER: Electrolytice 24.50c, Connecticut valley; Lake 24.62½c, delivered.

ZINC: High grade 13.85c, delivered. Die casting alloy 17.00c, delivered.

IRON AND STEEL SCRAP

(Ceiling prices per gross ton as established by the Office of Price Stabilization)

	*No. 1 Bundles	Cast Steel	**Steel, 2 ft & less	Punchings, Plate Scrap	Cast Iron Briquets
Birmingham	$39.00	$44.00	$39.00	$41.50	$39.00
Buffalo	43.00	48.00	43.00	45.50	43.00
Chicago	42.50	47.50	42.50	45.00	42.50
Cincinnati	43.00	48.00	43.00	45.50	43.00
Cleveland	43.00	48.00	43.00	45.50	43.00
Detroit	41.15	46.15	41.15	43.65	41.15
Eastern Pa.	42.50	47.50	42.50	45.00	42.50
Los Angeles	35.00	40.00	35.00	37.50	35.00
Pittsburgh	44.00	49.00	44.00	46.50	44.00
San Francisco	35.00	39.00	35.00	37.50	35.00
St. Louis	41.00	46.00	41.00	43.50	41.00
Seattle	35.00	40.00	35.00	37.50	35.00

Above delivered prices are ceiling levels at basing points indicated. * Applies to dealer and industrial scrap; No. 1 and No. 2 heavy melting steel are $1 less; No. 1 railroad heavy melting is $2 higher. **$2 higher if 1 ft or under.

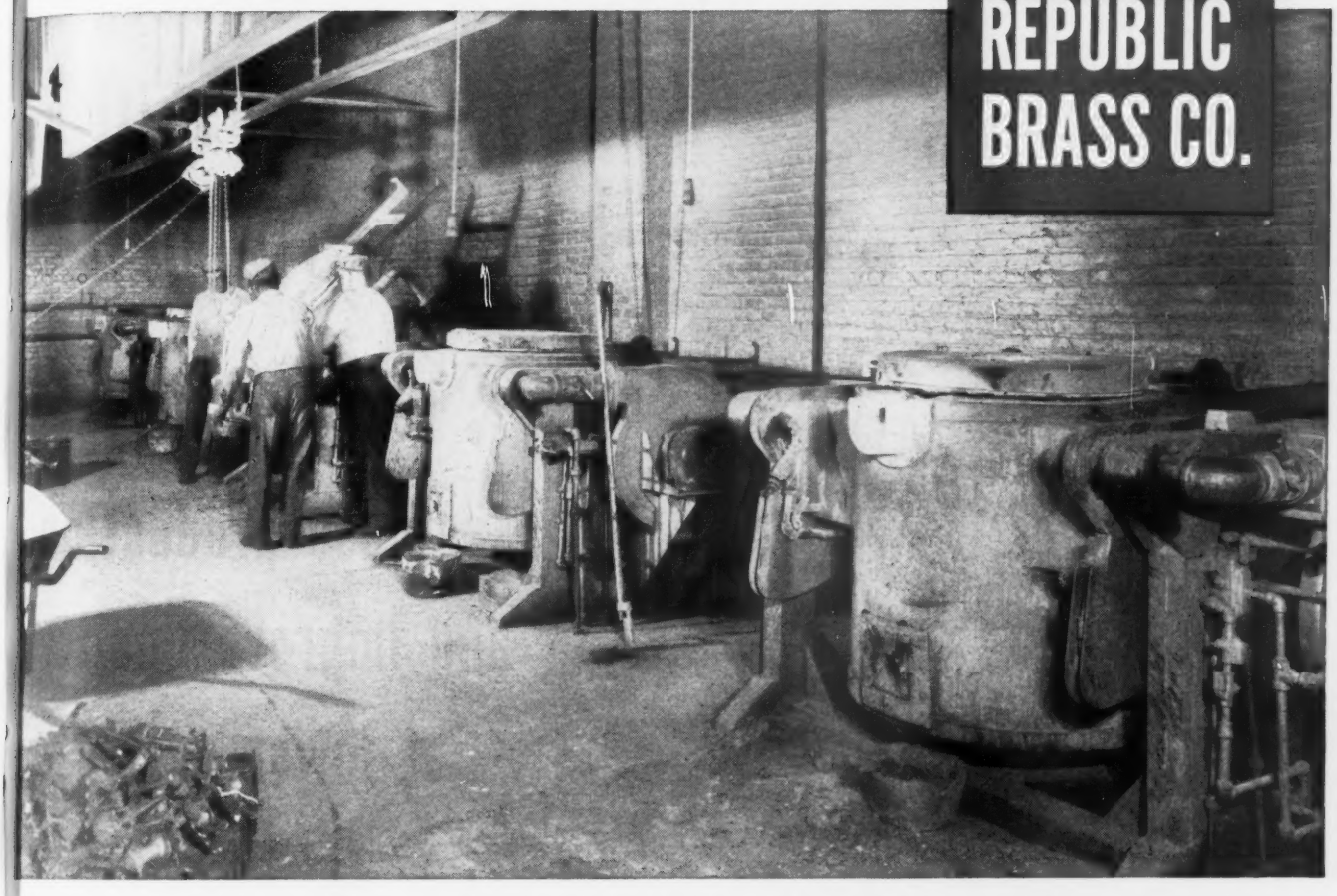
CAST IRON SCRAP

No. 1 cupola cast	$49.00
Heavy breakable cast	45.00
Burnt cast iron	41.00
Cast iron brake shoes	41.00
Stove plate	46.00
Clean auto cast	52.00
Unstripped motor blocks	43.00
Iron wheels, No. 1	47.00
Malleable	55.00
Drop broken machinery cast	52.00

Above ceiling prices, per gross ton, are f.o.b. shipping point. Add transportation charges to obtain delivered prices at any foundry.

6 LINDBERG-Fishers for 6 years

and all's well at REPUBLIC BRASS CO.



LINDBERG-Fisher BRASS MELTING FURNACES STAND THE GAFF

All's well at The Republic Brass Co., (Division of Briggs Mfg. Co.), Cleveland, Ohio—manufacturer of water faucets and related plumbing fixtures. In 1945, as part of a modernization program, Republic installed six Lindberg-Fisher brass melting furnaces. These oil fired, constant arc, nose-pouring furnaces have more than withstood the test of time . . . and maintenance has been almost nil.

Here's what Mr. J. J. Smith, Republic's foundry superintendent thinks of his six Lindberg-Fisher brass melting furnaces:

"We have had six Lindberg-Fisher brass melting, nose-pouring, 1200 pound capacity furnaces for six years, and have had very good results from them . . . they deliver more than 100 heats per crucible . . . one hour twenty minutes per heat . . . 18 months lining life. They have performed very satisfactorily as to upkeep, and we have had excellent operating results."

Check these advantages of Lindberg-Fisher Hydraulic Nose-Pouring Melting Furnaces

- Constant pouring arc regardless of degree of furnace tilt.
- Rate of pouring always under positive and constant finger-tip control.
- Special trunnion mounting permits lower construction than hand tilting furnace.
- Reduced height facilitates charging cold metal, and observation of metal.
- Metal waste and pouring hazard greatly reduced by closeness of ladle to pouring spout.
- Labor saving . . . simple control enables one man to pour and transfer metal.

Write for Bulletin No. 57-A for more information on MNP-Motorized Tilting and HNP-Hydraulic Tilting Constant Arc Nose-Pouring Furnaces.

LINDBERG-Fisher MELTING FURNACES

Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois

ACTUAL SAND TESTS

BEFORE

HENRY FURNACE CO.
SAND TEST REPORT

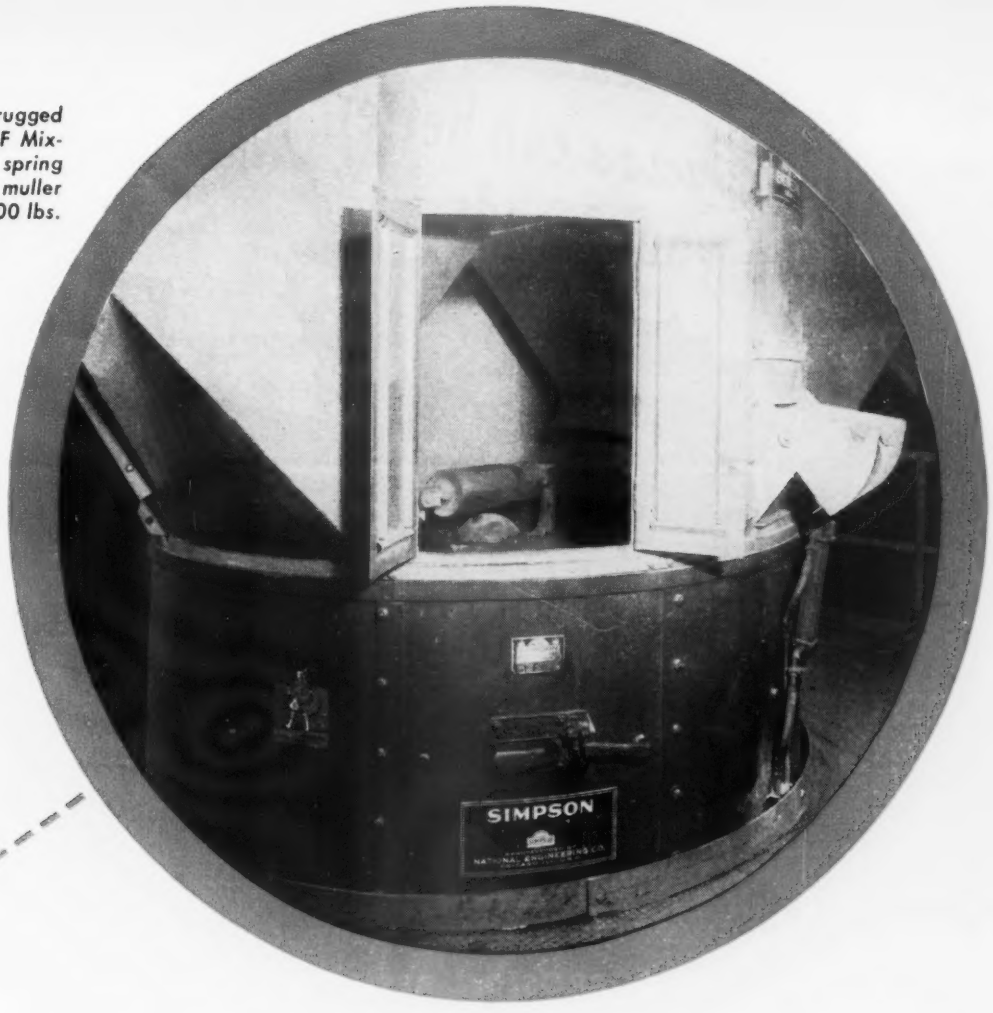
H2O	PERM.	G. C.	G. S.		
7.4	47	7.8	1.0	October	22
7.8	41	7.0	1.3	"	23
7.0	48	7.1	-1	"	24
7.8	42	7.9	-1	"	25
7.0	53	6.6	1.2	"	26
7.4	50	7.8	2.1	"	29
7.6	49	7.6	1.4	"	30
8.0	44	8.0	1.3		
7.6	44	7.3	1.6		

HENRY FURNACE CO.
SAND TEST REPORT

H2O	PERM.	G. C.	G. S.		
1.7	160	12.3	3.5	December	3
2.0	160	10.1		"	3
2.4	210	10.5	3.1	"	4
2.0	145	10.0	3.2	"	5
2.8	200	9.8		"	5
2.0	145	10.7	3.1	"	8
2.6	130	9.7	2.9	"	9
1.8	150	11.0	3.4	"	10

AFTER

"pin-point" ability of **SIMPSON** *MIX-MULLERS*® to increase production and improve quality at lower cost



• *Typical view of the rugged new 2000-lb. capacity 2F Mix-Muller. Note compression spring which provides variable muller pressures from 800 to 2000 lbs.*

HENRY FURNACE CO. GOES TO ALL-SYNTHETIC SAND . . . utilizes versatile 4-screen sand for all castings

Read the two actual sand test reports shown on the opposite page. These typical reports, made at the Henry Furnace Company foundry, Medina, Ohio, show the sand characteristics before and after installing a new 2F Simpson Intensive Mix-Muller. You can see at a glance that the quality of the Simpson-mulled sand shows tremendous improvement in every category . . . moisture is down . . . permeability and green strengths are more than doubled in most cases.

In addition to these improvements, this progressive foundry reports that proper control of their mixing with the Simpson Mix-Muller has resulted in a *50 per cent reduction in bonding material*—and that scrap due to sand is practically non-existant.

From an over-all operating standpoint, the most important advantage gained through the use of their new 2F Mix-Muller is the fact that this foundry can now use *all-synthetic* sand—and to utilize the advantage of a 4-screen sand for all castings, which vary from one quarter to hundreds of pounds. This sand has the inherent advantages of much better flowability and ease of shakeout.

Here, then, is *another* job well done by Simpson Mix-Mullers. Why not let our engineers show you what these high production mullers can do for you? In the meantime, send for a copy of Bulletin 511.

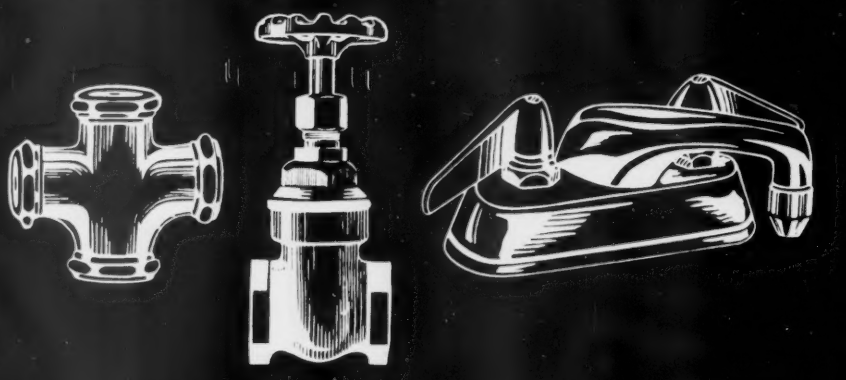
National Engineering Company
(Not Inc.)
608 Machinery Hall Bldg. • Chicago 6, Illinois

SIMPSON *Intensive* MIX-MULLERS

Manufacturers and Selling Agents: For Continental European Countries — George Fisher, Ltd., Schaffhausen, Switzerland; for British Possessions — August's Limited, Halifax, England; for Canada — Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney, for Argentina, Brazil and Uruguay — Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico — CASCO ,S. De R.L., Mexico, D.F.

Why *Brass* can better serve your needs

Beauty and ENDURANCE



PLUMBING ENGINEERS ADVOCATE BRASS CASTINGS FOR CORROSION RESISTING QUALITIES . . . .

Brass castings possess good machining qualities, which result in a four-fold combination of preferred properties. Economy . . . beauty . . . corrosion resistance and machinability. These factors are essential in the production of quality plumbing products.

FREE . . . Write for your copy of the 8-page Lavingot Technical Journal—Vol. 8, No. 4—containing an article discussing "Fume Control in the Brass Foundry."

Specify—LAVIN NONFERROUS INGOT—*Quality*

Brass · Aluminum · Bronze · Zinc Base Die Casting Alloys

R. LAVIN & SONS, INC.

- *Refiners of Brass, Bronze and Aluminum*
- *Producers of Zinc Base Die Casting Alloys*

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REPRESENTATIVES IN PRINCIPAL CITIES

R. LAVIN & SONS, INC. 1900 53 Years 1953 SERVING THE FOUNDRY INDUSTRY

Let Pangborn prove, at no cost to you, why you should

SWITCH TO

MALLEABRASIVE®*

(SHOT AND GRIT)

for the LOWEST OVERALL CLEANING COSTS you've ever had!

THAT'S RIGHT! Pangborn is prepared to prove to you that Malleabrasive does a better cleaning job at lower overall cost than any other abrasive you've ever used! Here's a challenge you can't afford to pass up! Pangborn will test Malleabrasive *in your plant* for 30 days, without any cost to you. Your machines will be expertly adjusted by Pangborn engineers to get the greatest benefit from Malleabrasive. Your work schedule will go on uninterrupted, while this fair, scientific test is being run. At the end of 30 days, you'll have your proof!

We *know* we can convince you, because we've *already proved* Malleabrasive in foundries all over the country. What's more, since Pangborn *makes* blast cleaning machinery, we have tested *all* the abrasives, to determine the best. Malleabrasive won on all counts!

The *original* premium abrasive, Malleabrasive has approximately 50% longer life than other premium abrasives—2 to 4 times the life of ordinary abrasives. It reduces down-time and protects your investment because Malleabrasive makes machinery parts last longer. It turns out perfectly cleaned castings *every time*, and actually costs far less per ton of castings cleaned!

Don't just take our word for it! Let Pangborn engineers run this impartial test in *your* shop. For more information, write to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

Malleabrasive Guarantees Lower Cleaning Costs and Better Cleaning Jobs Than Any Other Abrasive!

Packed in orange striped 100-pound bags

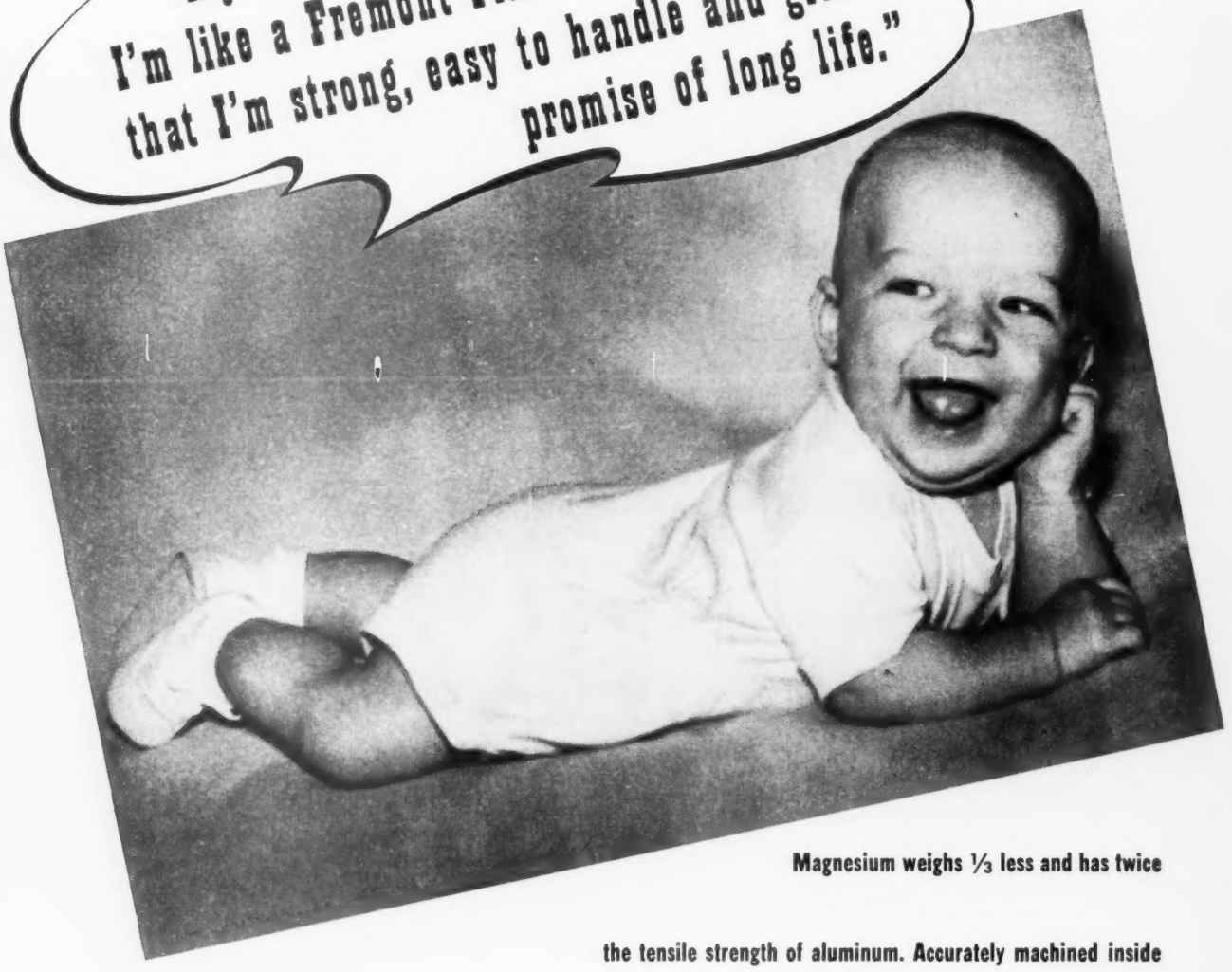
Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job

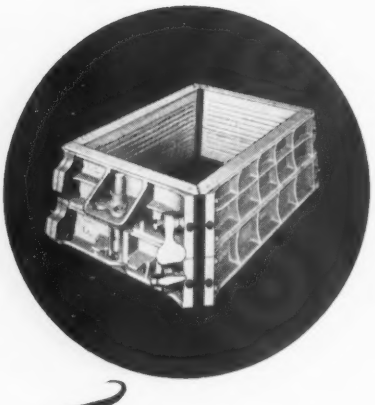
*U.S. Patent #2184926 (other patents pending)

"My dad says
I'm like a Fremont Flask . . . .
that I'm strong, easy to handle and give
promise of long life."



Magnesium weighs ⅓ less and has twice the tensile strength of aluminum. Accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges, make more exacting work possible with Fremont Flasks. Write today for free literature and prices on the new

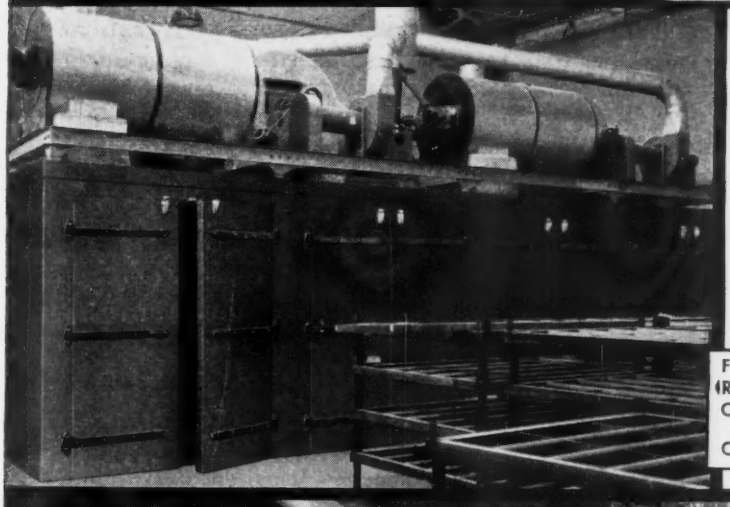
FREMONT SPREADLOCK FLASK, FREMONT STANDARD SLIP FLASKS, FREMONT CAST IRON OR CAST ALUMINUM JACKETS



THE FREMONT FLASK COMPANY

Fremont, Ohio

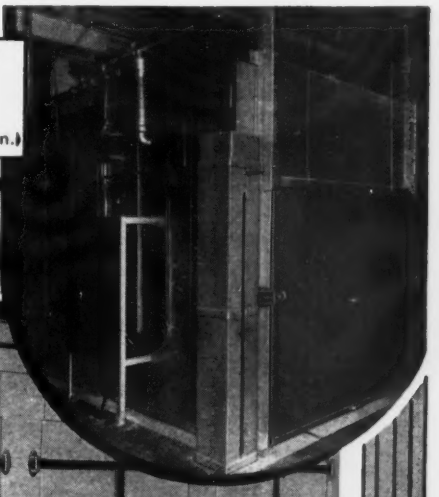
Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

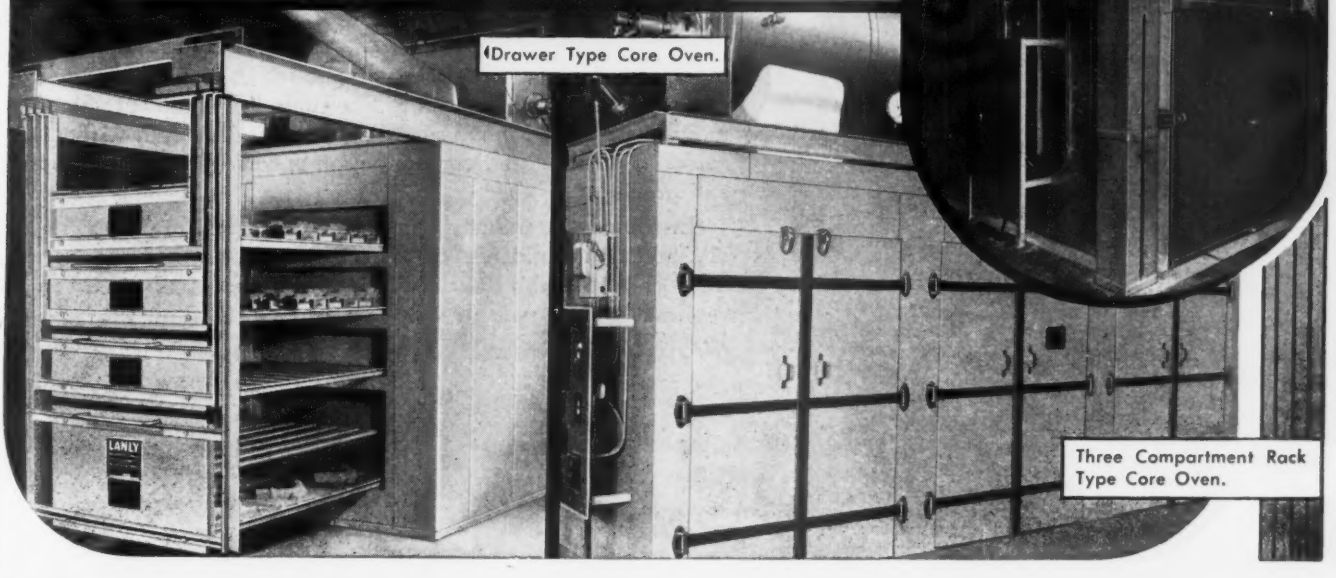


The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

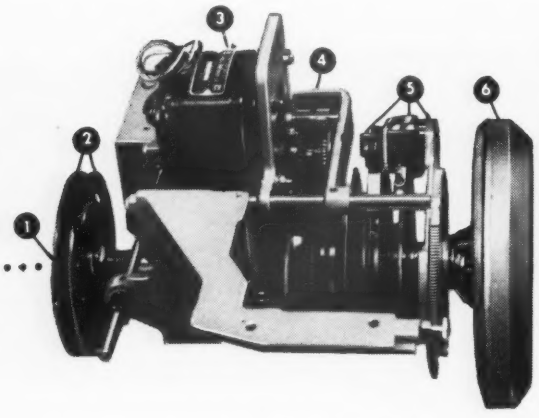
Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.

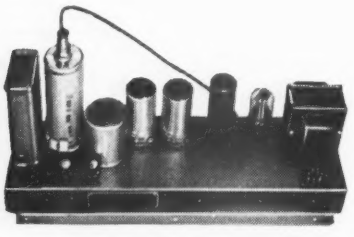




1. Center line of slidewire and shaft
2. Control cams
3. Balancing motor
4. Spring-loaded no-backlash drive
5. Control slidewires
6. Measuring slidewire



This partially dis-assembled view of Speedomax shows its two-phase Balancing Motor and gears, with a typically "heavy" load of slidewires and contacting cams for signal and control devices. Several more cams, etc., can be added if necessary; only practical limit is physical space on shaft. Smoothness in operating many contacts is an outstanding Speedomax ability.



Amplifier which feeds the Speedomax balancing motor the controlling half of its power. Torque gradient is especially high where needed most—around balance point—for prompt, positive balancing. This Amplifier leads its field by large margins in sensitivity and in power output.

Good circuit engineering shows in this Slidewire's non-inductive wiring and in the absence of any flexible leads which might form inductive loops.

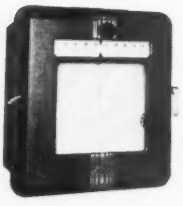
CAREER OPPORTUNITIES AT L&N

Expansion program of this long-established firm has many features to attract outstanding recent graduates in engineering and science. Opportunities are in sales field engineering, product and application engineering, research, advertising, market development. Widely-respected policies assure recognition of progress and achievement. Address Personnel Manager for preliminary interview at nearest of 17 L&N offices.

Jrl. Ad. ND46(8)

POWER IS PERFORMANCE

... and Speedomax Instruments lead with "huge" 12-watt balancing motors!



• Power underlies good performance, in instruments as in automobiles, machine tools or rolling mills. That's why L&N engineers insist that an automatic instrument should operate as positively and promptly as any other high-grade machine.

Even the first null balance potentiometer Recorder we built, back in 1911, which went to a steel mill, had a 110-volt motor instead of a spring drive to run its balancing mechanism, chart and signalling contacts. And, while its pioneering of balance-method measurement attracted the most attention, its ample power certainly helped establish L&N Recorders as the coming idea in process Instrumentation.

Power has done the same for Speedomax instruments. Twenty years ago, Speedomax pioneered the electronic idea of measurement—in a husky, powerful piece of equipment. Today's models have from 2 to 4 times more power in their balancing motors than any other current models of electronic controllers, recorders or indicators.

This power means superior performance in both load-carrying and speed. Load-carrying ability applies especially when the motor operates, in addition, an unusual number of contact devices. But even the most usual Speedomax jobs—automatic control, for instance—can call on the instrument's power for high operating speed in handling the normal number of control devices. The strong, wide-faced, rigidly-mounted cams and gears so typical of Speedomax instruments start moving instantly, move rapidly and stop dead still without coast. Signalling and control action is correspondingly crisp and precise.

Speedomax for industrial use is described in Catalog ND46 (1); additional information for unusual applications is given in Technical Publication ND46(1). Either will be sent on request by our nearest office or from 4917 Stenton Ave., Philadelphia 44, Pa.

LEEDS NORTHRUP

instruments automatic controls • furnaces

THE MOST *Economical* WAY TO MELT *Quality Bronze*

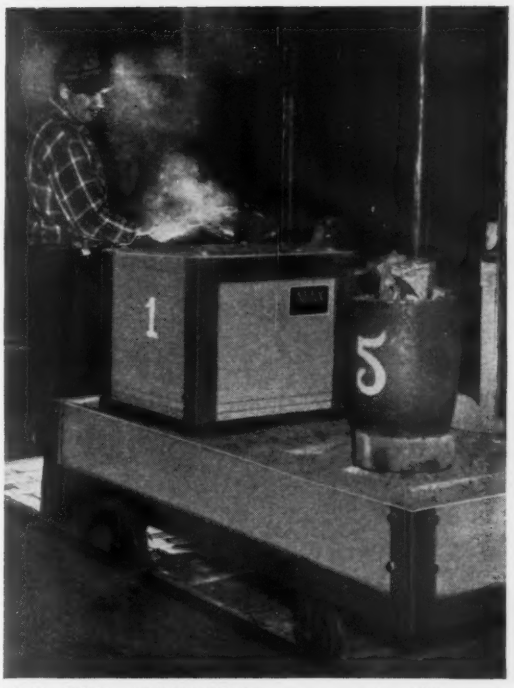
AJAX-NORTHRUP INDUCTION FURNACES

An Ajax-Northrup equipped bronze foundry, melting a wide variety of alloys in lift-coil furnaces, reports 10% higher tensile strength for certain of its induction-melted alloys... and has reduced melting costs by over $33.00 a ton at the same time!

Similar performance is reported by users of the larger tilting furnaces. The tilting units are slightly more efficient than the lift-coil equipment, and are used where ability to switch alloys frequently is less important.

If you haven't looked into the possibilities of induction melting for your non-ferrous foundry lately, we'd like to show you some of the data we've gathered from recent installations. Just write or phone us.

149



LIFT-COIL FURNACES *can melt different alloys simply by switching crucibles.*

TILTING FURNACES *are used for larger quantities, or special production runs.*

AJAX NORTHRUP

INDUCTION HEATING AND MELTING

AJAX ELECTROTHERMIC CORPORATION
Ajax Park, Trenton 5, New Jersey

Associated Companies

AJAX ELECTROMETALLURGICAL CORP.
AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC.
AJAX ENGINEERING CORPORATION

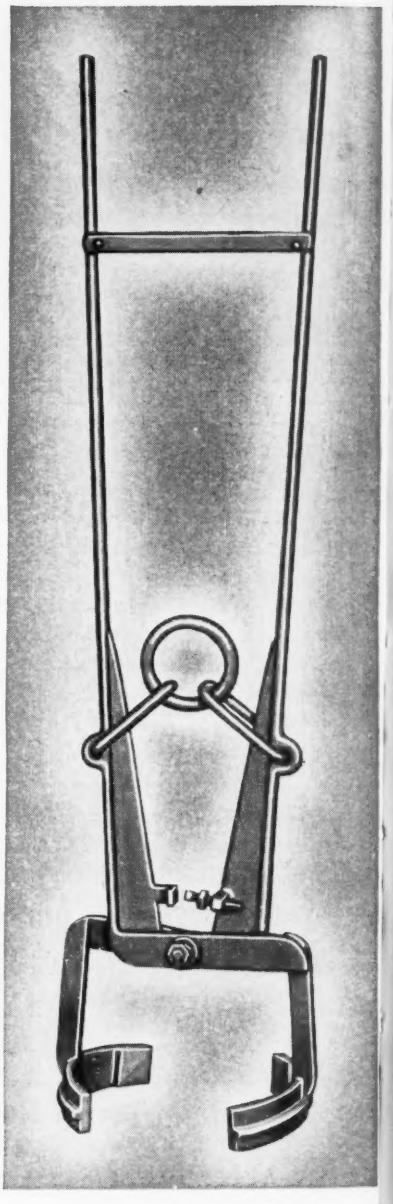
Since 1916

NO. 1 SOURCE FOR

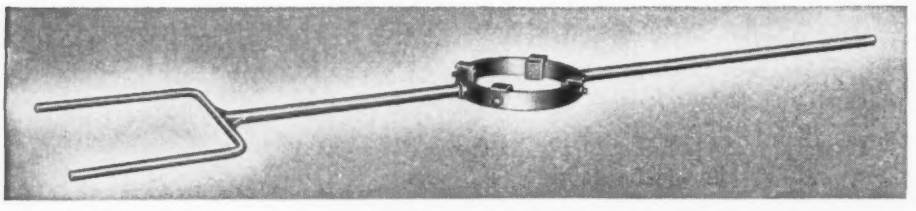
Bowls · Shanks · Tongs

Industrial Equipment round bottom pressed steel ladle bowl, 50 lb. capacity, type 7 flat side.

Industrial Equipment round bottom pressed steel ladle bowl, 60 lb. capacity, type 14 circular.

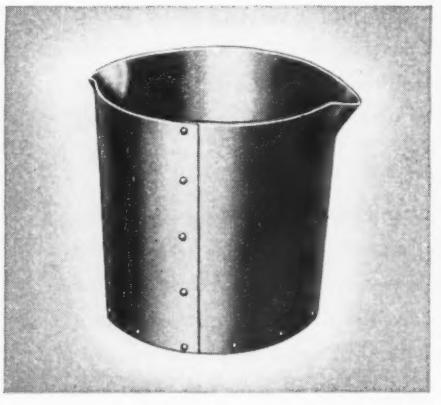


Type 72C crucible tongs. Adjustable. Four-point suspension. Claw types also available.



Industrial Equipment type 30CA single and adjustable ladle and crucible shank. Four-point suspension . . . easily adjustable . . . no springs . . . air cooled band. Fixed band types also available.

Industrial Equipment type 514 flat bottom welded steel ladle bowl. Available in almost any size or thickness.



Industrial Equipment 537 flat bottom riveted steel ladle bowl.

The above Industrial Equipment products, along with dozens of other types of bowls, shanks, tongs and ladles, are included in our latest catalog. *Write for your copy.*

LADLES

SHANKS

BOWLS

TONGS

Industrial

EQUIPMENT COMPANY

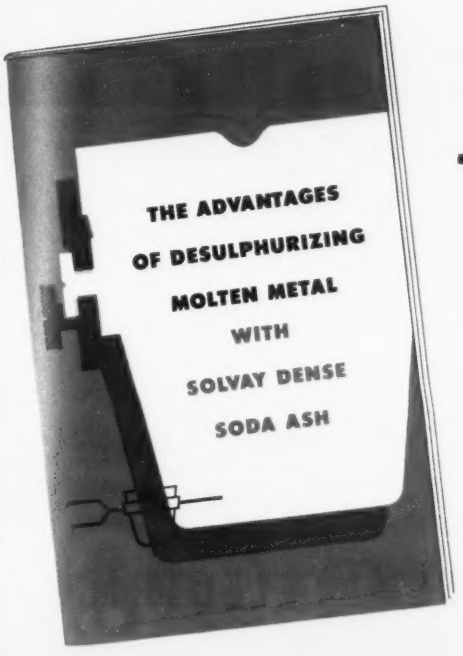
115 NORTH OHIO ST., MINSTER, OHIO

Desulphurization with SOLVAY DENSE SODA ASH

✓ Offers Many Advantages

✓ Costs Less

SOLVAY DENSE SODA ASH is especially effective for desulphurization. This 100% active material helps produce better, more fluid metal . . . and gives you these other advantages: it's free-flowing; the small grains melt very rapidly, allowing faster, more uniform dispersion; and it's easily added by means of simple equipment. The use of Solvay Dense Soda Ash is a flexible one—you use only as much as you need. And remember, Solvay Dense Soda Ash is the *low cost* form of desulphurization!



Further Information Contained in Valuable Book—Available on Request

"The Advantages of Desulphurizing Molten Metal with Solvay Dense Soda Ash" has been published by Solvay for the benefit of the foundryman. It contains important information on the advantages you can gain by desulphurizing with Solvay Dense Soda Ash. It also explains what type of equipment is needed and how to obtain it. This book is available free—on request—by simply writing to Dept. F-2. Be sure to get your copy.

SOLVAY PROCESS DIVISION
ALLIED CHEMICAL & DYE CORPORATION
61 Broadway, New York 6, N. Y.

BRANCH SALES OFFICES:
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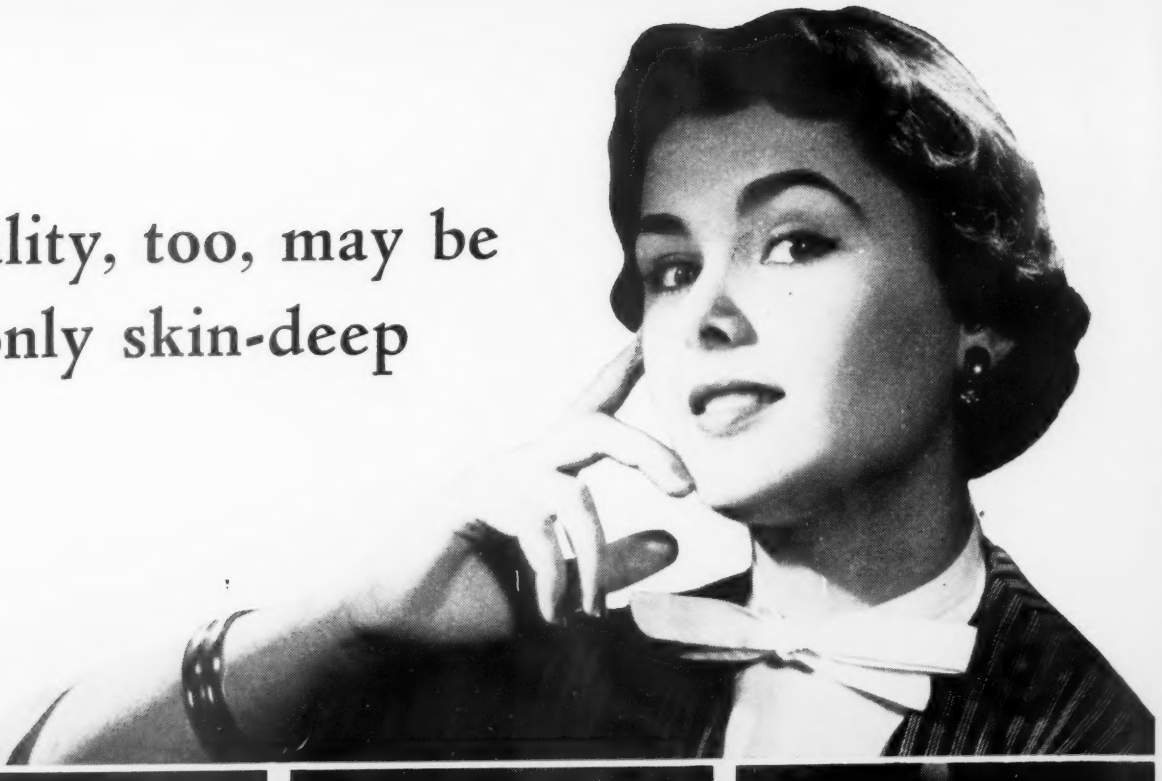
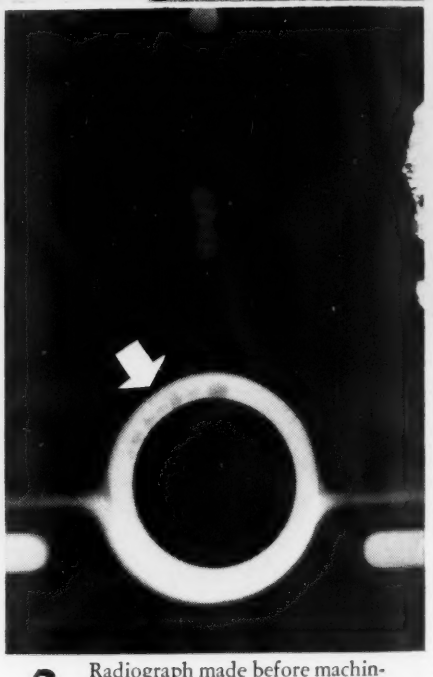
Soda Ash · **Caustic Soda** · **Chlorine** · **Potassium Carbonate** · **Calcium Chloride**
Caustic Potash · **Sodium Bicarbonate** · **Ammonium Bicarbonate** · **Specialty Cleansers**
Sodium Nitrite · **Para-dichlorobenzene** · **Ortho-dichlorobenzene** · **Monochlorobenzene**
Ammonium Chloride · **Sesquicarbonate of Soda**

Quality, too, may be only skin-deep



1 This apparently sound casting comes from the foundry ready for subsequent machining.

2 Machining uncovers blowholes at critical point—necessitating rejection or repair.



3 Radiograph made before machining would have revealed blowholes, saved time and money.

For fast, non-destructive inspection, use General Electric Industrial X-Ray

Whether you're buying or selling castings, x-ray inspection is a high-speed, low-cost method of insuring unvarying quality. Hidden defects in job lots or on production lines are detected prior to expensive finishing operations.

The above illustrations show why so many leading industries today rely on x-ray for non-destructive inspection. In many plants, x-ray is also used as a development tool — to disclose where savings can be made, designs improved, new techniques developed.

Chances are, there's a place for industrial x-ray in your business. We will be glad to appraise your needs. Or, if you have a specific problem, GE has probably handled a parallel situation. You can benefit from this previous experience by writing X-Ray Department, General Electric Co., Milwaukee 1, Wis., Rm. YY-2.

You can put your confidence in —

GENERAL ELECTRIC

but it's worth it to get those BUFFALO PATTERNS"

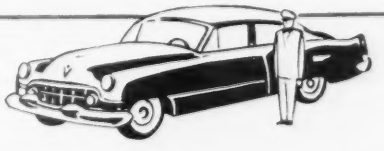
Most of us hate to leave our families, but business is business, and the foundry men who are handling the big business know why it pays to always use Buffalo Patterns.

Here they find a *new* kind of Engineering service that accurately plans *every* detail of *every* job. Coupled with this is the old fashioned kind of Fine Craftsmanship that refuses to ever turn out a mediocre job. What does this mean to you? Well, it means just this: When a Buffalo equipment is installed at your plant, there is *never* any adapting or extra rigging to do. You'll find that your Buffalo Patterns will fit your foundry and your production schedules like magic. In addition... your scrap ratio will drop to an all time low.

That's why more and more profit-minded pattern buyers are looking to Buffalo for *better* patterns for their *better* jobs. Why don't you?

BE OUR GUEST

Just let us know when you are coming to Buffalo on pattern business. One of our cars will meet you at your plane or train and transport you to our club where you will be our guest during your stay.



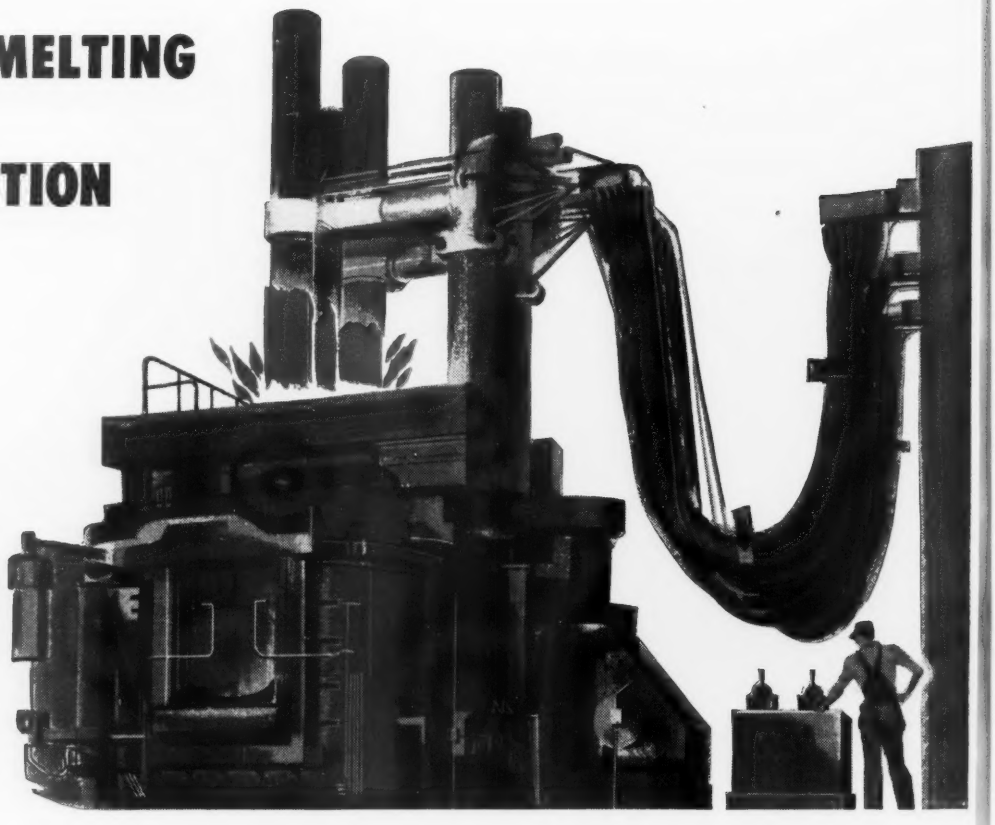
Production and Experimental Pattern Equipment • Models, Machined Parts, Jigs and Templates • Shell Mold Pattern Equipment • Permanent Molds for Foundries, Injection Plastics and Reinforced Plastics Pattern Engineering Drawings • Forging Dies • Non-Ferrous Castings • Shell Mold Castings • Metallizing

BUFFALO PATTERN WORKS, INC. • **832 HERTEL AVE., BUFFALO 16, N. Y.**

DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

Lectromelt*

FURNACES FOR MELTING, REFINING, SMELTING AND REDUCTION



35 years ago, the first Moore Rapid Lectromelt Furnace was put to work, setting the pace which established these furnaces as leaders in industry. Bold thinking throughout the years has maintained that position and, today, Lectromelt Furnaces are first choice internationally for all types of melting, refining, smelting and reduction.

From the automatic controls that guide the operation of a Lectromelt Furnace to its massive shell, Lectromelt Furnaces are built as production tools. Assembled and mechanically operated on the erection floor at Pittsburgh, they go together faster in your plant, and you get into production with minimum delay.

Lectromelt Furnaces offer you rapid top-charging, high-speed melting, accurate control of quality and low-cost operation. They give long, trouble-free service and correspondingly low upkeep costs. We sell mighty few replacement parts; evidence of their durability.

Catalog No. 8 describes iron and steel melting and refining work. For a free copy, write Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... Lectromelt

Core Magic!

KORE-SET is an entirely different type of resin, developed for all types of core work.

It is unique in the hardness and smoothness it gives to cores. Kore-Set cores are being made so strong that all wires are eliminated or else reduced by 75%. Blowing of Kore-Set sand is completely satisfactory without sticking or frequent cleaning of blower boxes and heads.

Baking time can be shortened. Kore-Set is not critical as to oven conditions or air circulation, and bakes out over a wide range.

Collapsibility of Kore-Set sand is much faster than with ordinary binders. Suitable formulation will control collapsibility to any required degree.

Kore-Set has no odor and does not generate unpleasant fumes. No dermatitis.

A Kore-Set mix holds its high green strength for three days or more. It does not require remixing unless moisture content has been reduced too much by evaporation. This water loss can be easily made up.

Kore-Set does not evolve as much gas as ordinary binders, and reduces core blows to a minimum.

Kore-Set cores cut cleaning costs by as much as 50%.

Specialty Products Company
190 Warren St., Jersey City 2, N. J.

Please ship us gratis a working sample of Kore-Set with instructions on its use.

Signed..... Title.....

Company.....

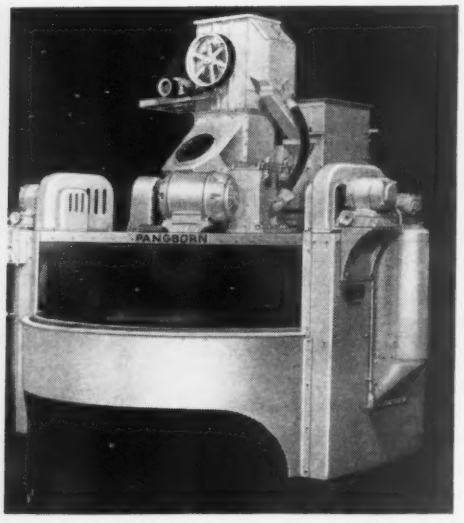
Address.....

City..... Zone..... State.....

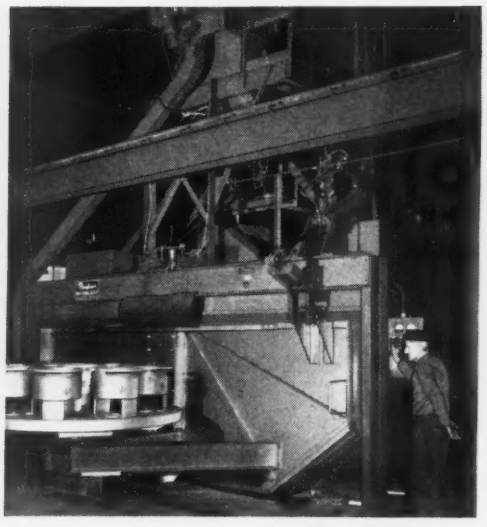
We cast: ( ) steel; ( ) cast iron; ( ) aluminum); ( ) brass-bronze; ( ) stainless; ( ) nodular iron.

SPECIALTY PRODUCTS COMPANY
190 WARREN STREET • JERSEY CITY 2, N. J.
SPECIALTY CHEMICAL CO., San Mateo, Calif. *SPECIALTY PRODUCTS CO., LTD., Montreal, Canada*
HICKORY SPECIALTY CO., Hickory, N. C.

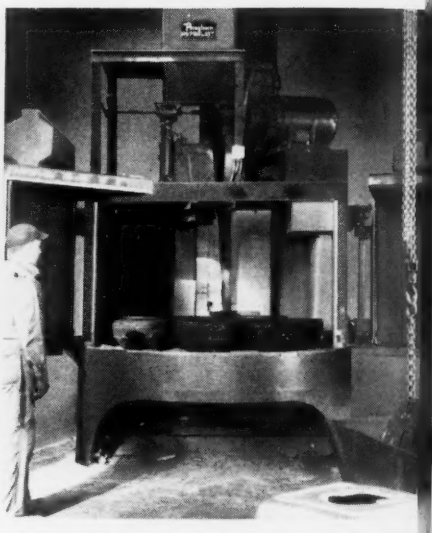
8 Ways Pangborn and You--Time



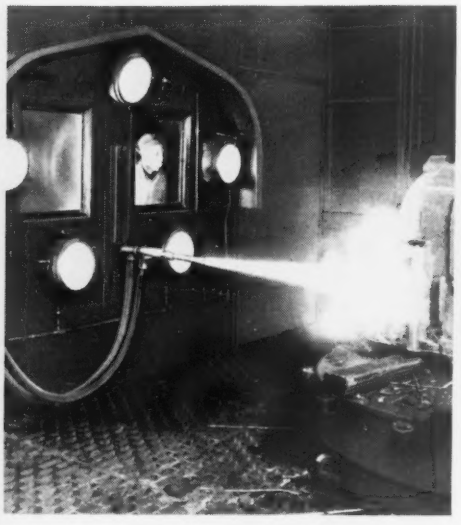
● Pangborn ROTOBLAST® Tables for semi-continuous blast cleaning. Types and sizes for castings of all sizes with many surfaces, intricate shapes, and pockets.



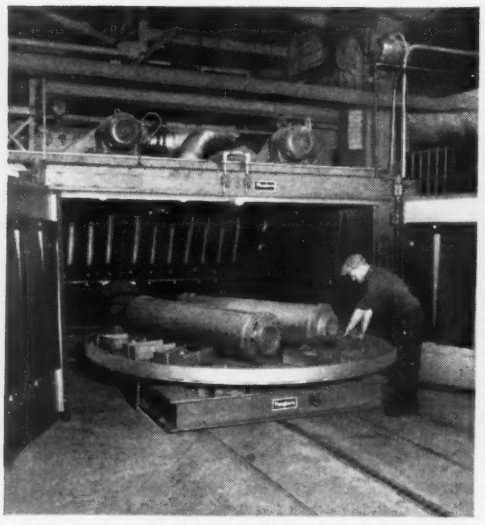
● Pangborn Turnstyle Tables allow simultaneous loading and cleaning as one of two tables is always in blast chamber. For general blast cleaning.



● Panbgorn ROTOBLAST Table-Rooms clea castings from a few pounds to 2½ ton Extremely efficient for jobbing foundrie Perfect for all-purpose blast cleaning.



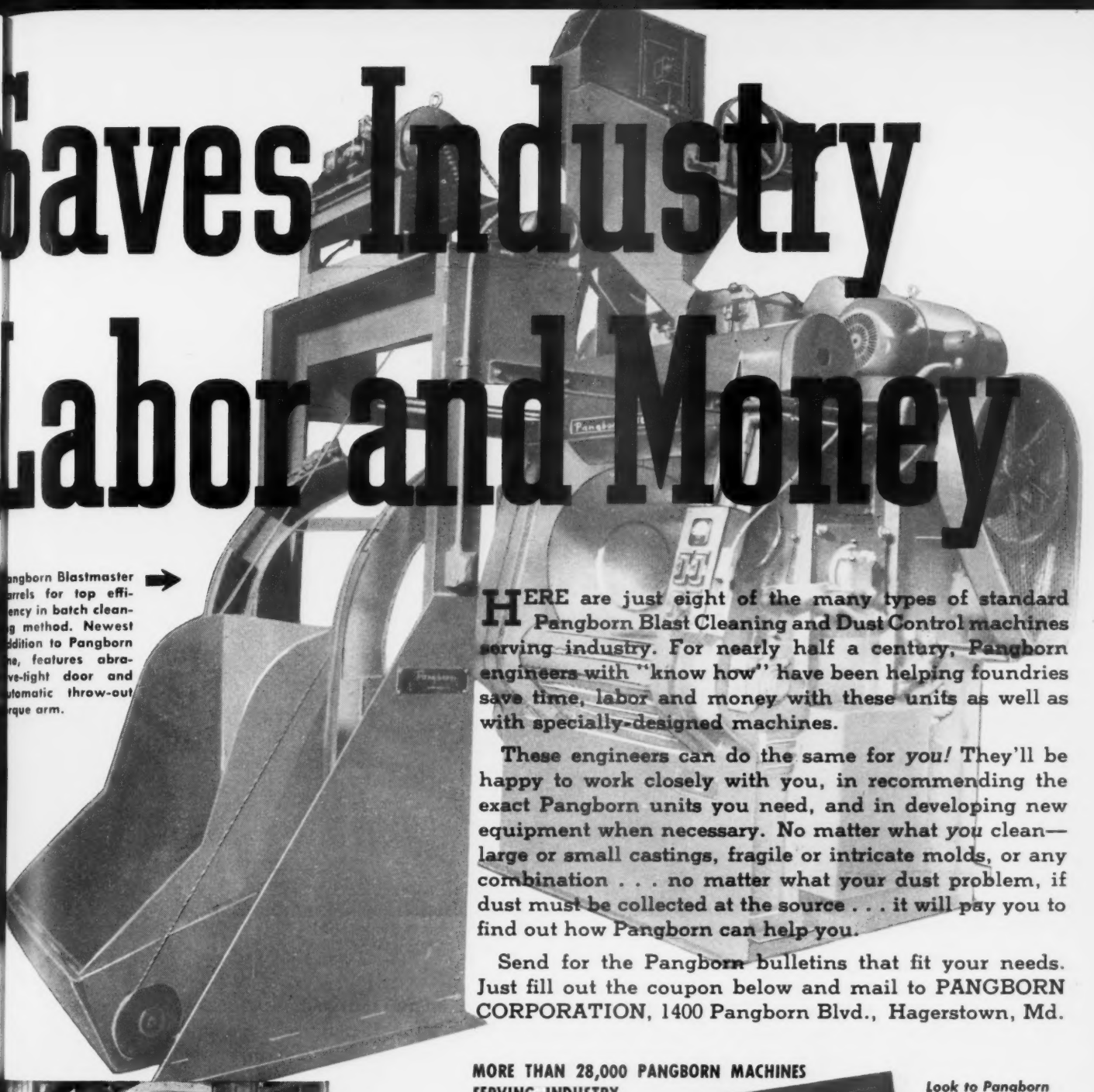
● Pangborn Hydro-Sand Blast Rooms for simultaneous blast cleaning and core removal. Use high-pressure stream of sand and water operated from outside.



● Pangborn Airless ROTOBLAST Rooms for general blast cleaning of extra-large castings. Neither compressed air nor water is necessary. Operated from outside.

● Pangborn special equipment for unusua blast-cleaning problems. Designed onl after careful study by Pangborn engineer skilled in such problems.

...saves Industry ...e, Labor and Money



angborn Blastmaster arrels for top effi- ency in batch clean- g method. Newest dition to Pangborn ne, features abra- ve-tight door and utomatic throw-out rque arm.

HERE are just eight of the many types of standard Pangborn Blast Cleaning and Dust Control machines serving industry. For nearly half a century, Pangborn engineers with "know how" have been helping foundries save time, labor and money with these units as well as with specially-designed machines.

These engineers can do the same for *you!* They'll be happy to work closely with you, in recommending the exact Pangborn units you need, and in developing new equipment when necessary. No matter what *you* clean—large or small castings, fragile or intricate molds, or any combination . . . no matter what your dust problem, if dust must be collected at the source . . . it will pay you to find out how Pangborn can help you.

Send for the Pangborn bulletins that fit your needs. Just fill out the coupon below and mail to PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

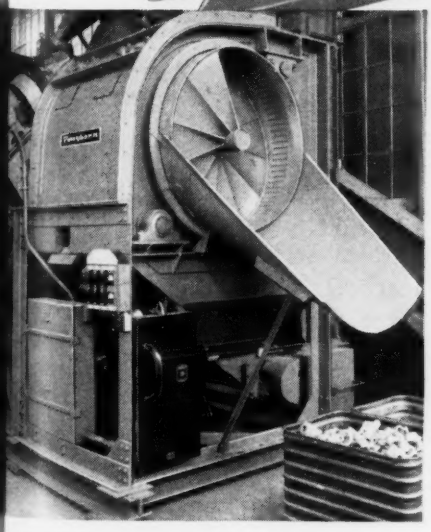
MORE THAN 28,000 PANGBORN MACHINES SERVING INDUSTRY

Pangborn

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION — FEMA

BLAST CLEANS CHEAPER
with the right equipment for every job



Pangborn Continuous-Flo ROTOBLAST Barrels for cleaning steady flow of miscellaneous work quickly. Operated by one man on production line basis.

MAIL THIS COUPON TODAY!

PANGBORN CORPORATION
1400 Pangborn Boulevard, Hagerstown, Md.

Gentlemen: Please send me the following bulletins:

- ☐ Tables
- ☐ Barrels
- ☐ Table Rooms
- ☐ Continuous-Flo
- ☐ Rooms
- ☐ Dust Control

Name .....

Company .....

Address .....

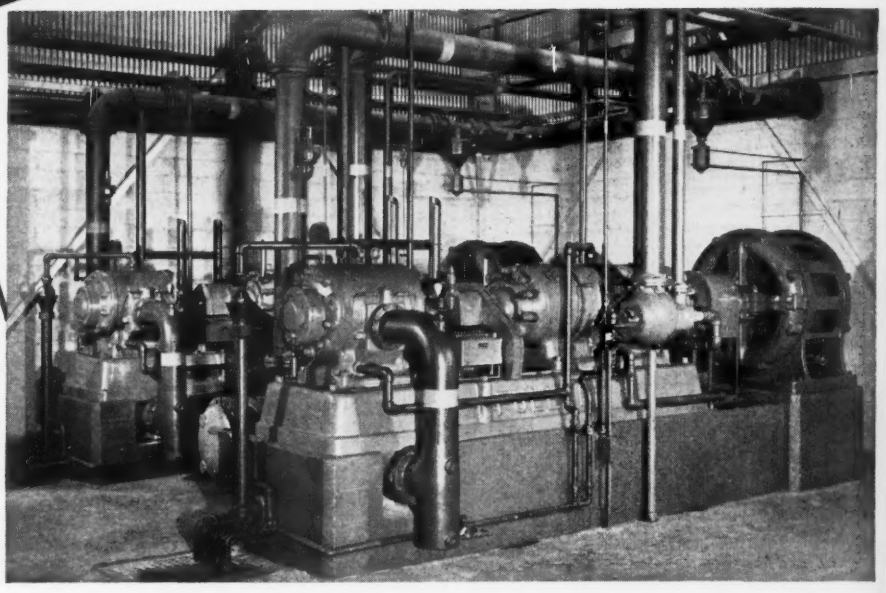
City ..... Zone ..... State .....

FEW moving parts

means LOW MAINTENANCE

means ECONOMICAL OPERATION

means FULL DEPENDABILITY



FULLER ROTARY COMPRESSORS are engineered and built right to insure a fully dependable source of air power for all steel plant and foundry operations. Moving parts have been kept to the minimum—rotor, bearings and blades—require little attention.

There are no valves to leak, no seats to grind. Blades automatically compensate for wear. Force-feed lubrication to all parts within the cylinder insures constant protection, with minimum wear.

Foundries and steel mills have put Fuller Compressors on the payroll. They've found them to be completely reliable under all conditions of service—and they've found them to be as economical to operate as they are dependable. Why not investigate this modern, efficient compressor the next time you are in the market? Write for Bulletin C-5, illustrating and describing these machines.

Fuller

DRY MATERIALS CONVEYING SYSTEMS AND COOLERS •
COMPRESSORS AND VACUUM PUMPS •
FEEDERS AND ASSOCIATED EQUIPMENT

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

C-215

What is it?

A White Cloud?

No, it's the mashed potatoes you see in the picture at lower left. A micro-photo shows us the beauty and wonder of a commonplace thing we take for granted.

Ohio Ferro-Alloys are just about as commonplace to iron and steel makers as mashed potatoes. But behind each Ohio Ferro product lie many years of research and development and into each product goes the finest materials and workmanship.

We invite your inquiries.

Ohio Ferro Products

- FERRO-SILICON 25 - 50 - 65 - 75 - 85 - 90%
- SPECIAL BLOCKING 50% FERRO-SILICON
- SILICON METAL
- HIGH CARBON FERRO-CHROME
- LOW CARBON FERRO-CHROME SILICON
- FERRO-MANGANESE
- BOROSIL
- SIMANAL
- RARE EARTH ALLOYS

Briquets

- SILICON
- MANGANESE
- SILICO-MANGANESE
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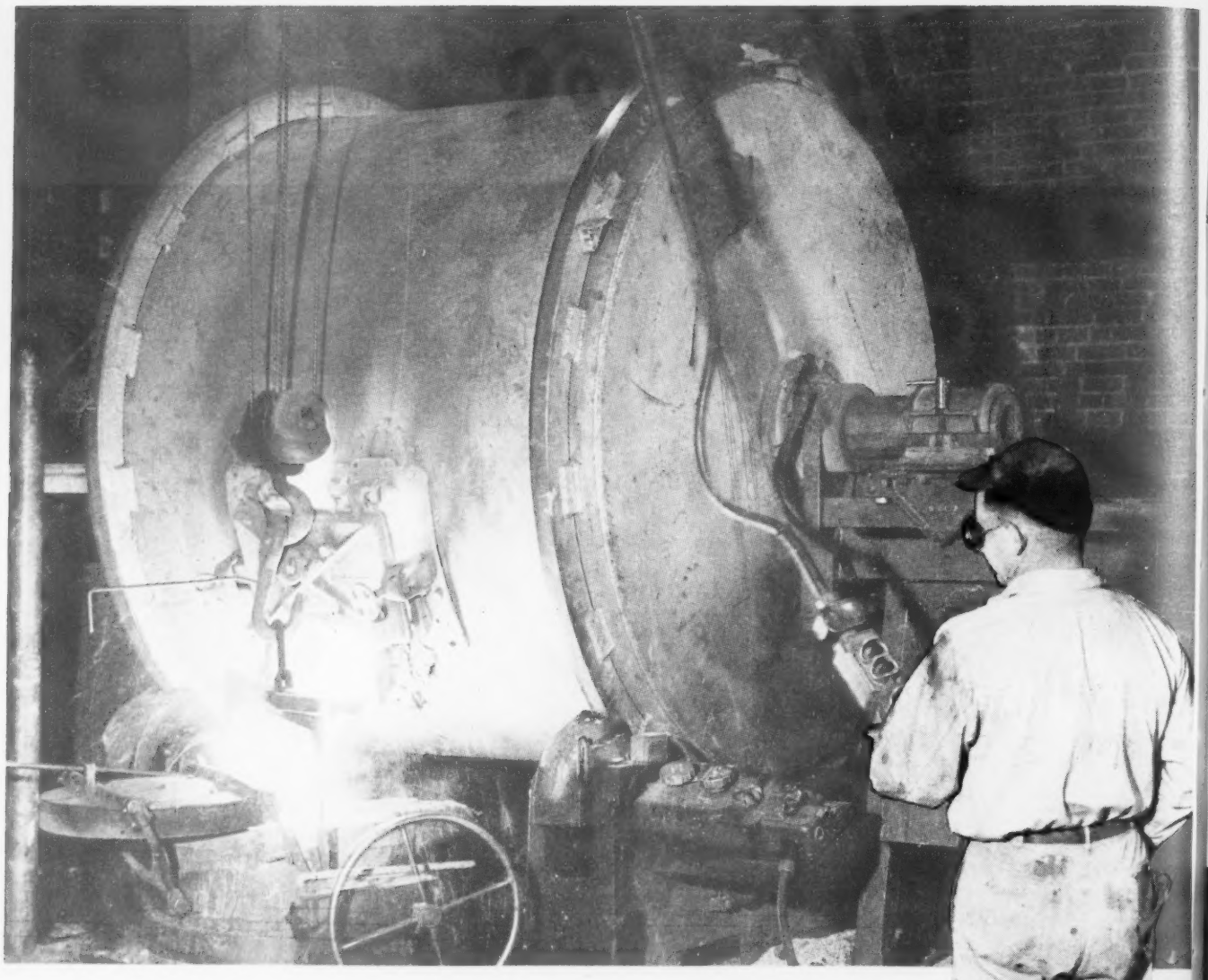
PHILO · TACOMA · RIVERDALE

DEPENDABILITY · QUALITY · SERVICE

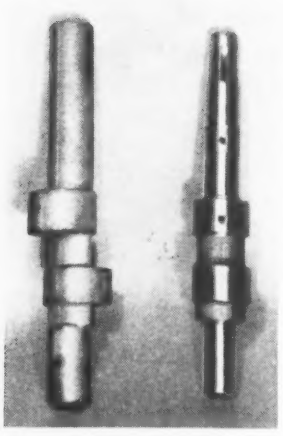
Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh Tacoma Seattle
Minneapolis Birmingham San Francisco Los Angeles



This furnace helps make ice cubes and cool breezes



Raw casting and finished crankshaft of York hermetic compressor. Cast from metal melted in Detroit furnace.

TWO Detroit Rocking Electric Furnaces produce the iron alloys for castings used by York Corporation in their ice-making and air conditioning equipment. The furnace illustrated has an 8000 lb. capacity; the other's capacity is 2000 lbs.

In the York foundry, Detroit Rocking Electric Furnaces were chosen to meet the requirements for high quality heats produced with speed and economy. Rocking action of the furnaces makes full use of heat from the indirect arc, and guarantees a homogeneous melt. Better metal means better castings, fewer rejects, lower cost.

Investigate Detroit Rocking Electric Furnaces for your needs. For ferrous and nonferrous metals. Capacities from 10 to 8000 lbs. Each installation is engineered to fit *your* particular requirement, solve *your* problem.

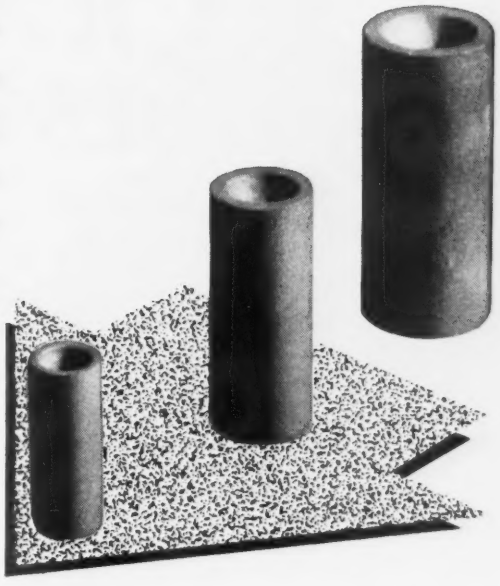
DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sau Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

THREE REAL REASONS WHY

you should use the NORBIDE Pressure Blast Nozzle:

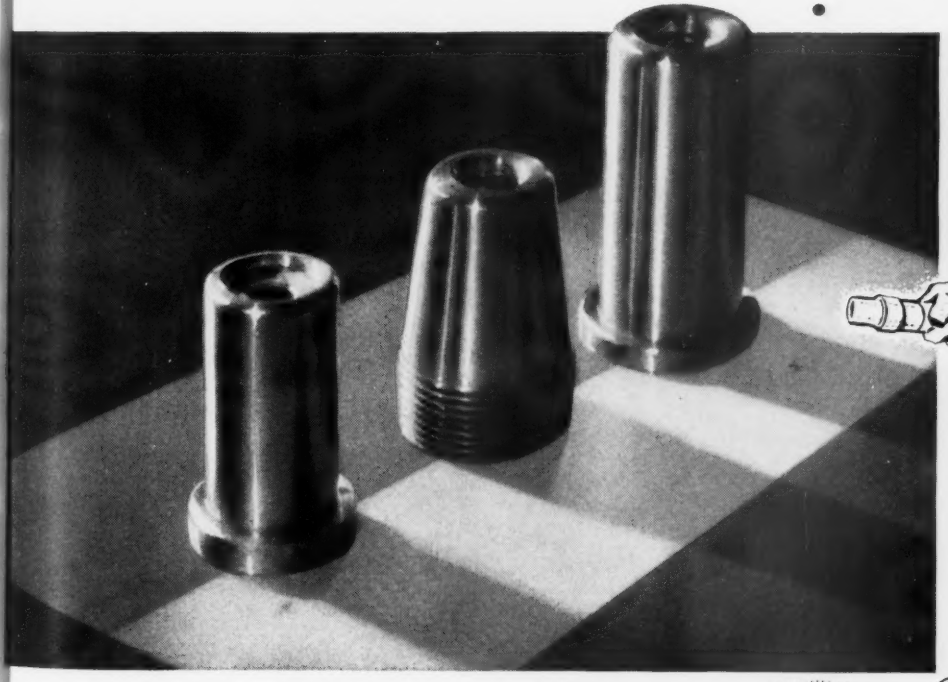


1. More service per dollar cost (750 hours silica sand — 1500 hours steel grit or shot). Norton guarantees this minimum service.

2. Decreases air consumption from 10 to 20 percent as compared with iron nozzles.

3. Maintains stream contour and abrasive velocity.

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS

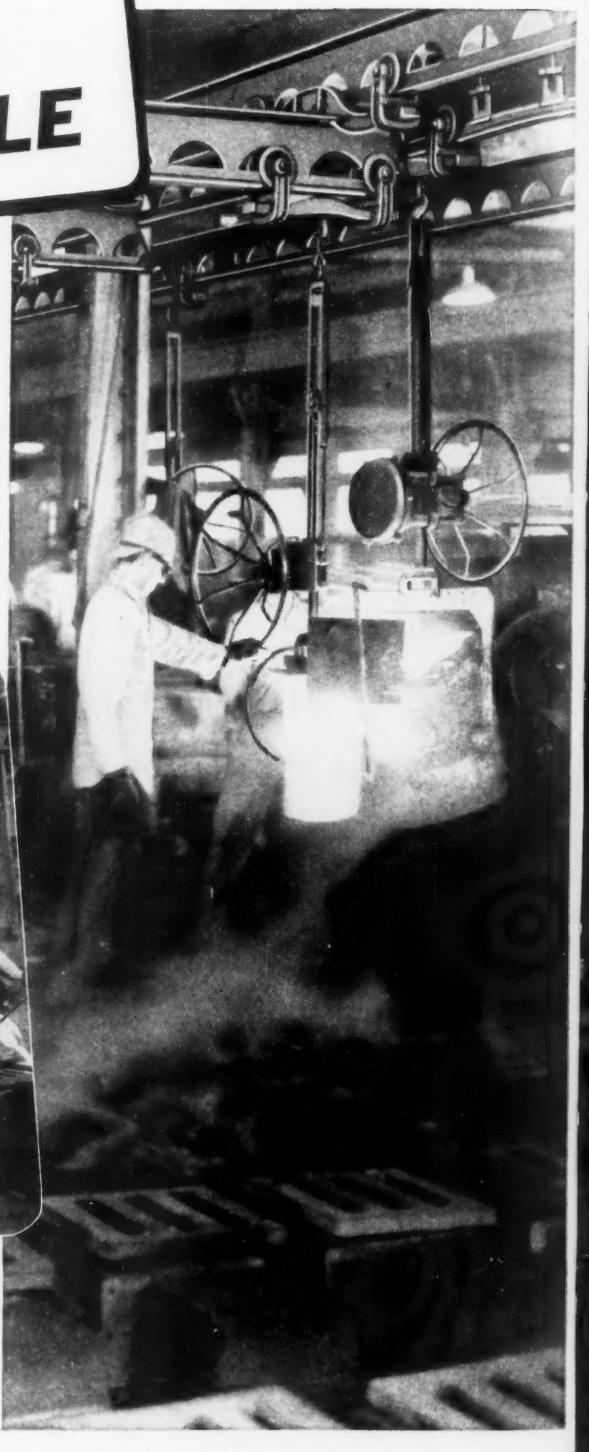


Only the diamond is harder than Norbide

NORTON

Making better products to make other products better

A CRANE FOR EVERY LADLE



Pouring is fast, safe, easy, when every man on the floor is provided with a Cleveland Tramrail Crane. All hand carrying is eliminated. Metal moves from cupola to molds in quick time thereby reducing heat loss.

Workers' fatigue is far less at the end of a day. Efficiency is pushed up enormously—sometimes 200 to 300 per cent.

Many hundreds of foundries,—large, medium and small—have installations of Cleveland Tramrail and are greatly profiting thereby. Why not let us consider your situation?

There is no easier way to handle metal than via Cleveland Tramrail. No hand carrying. No spillage. No hard work. The ball-bearing wheeled carriers ride freely on the smooth overhead track.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

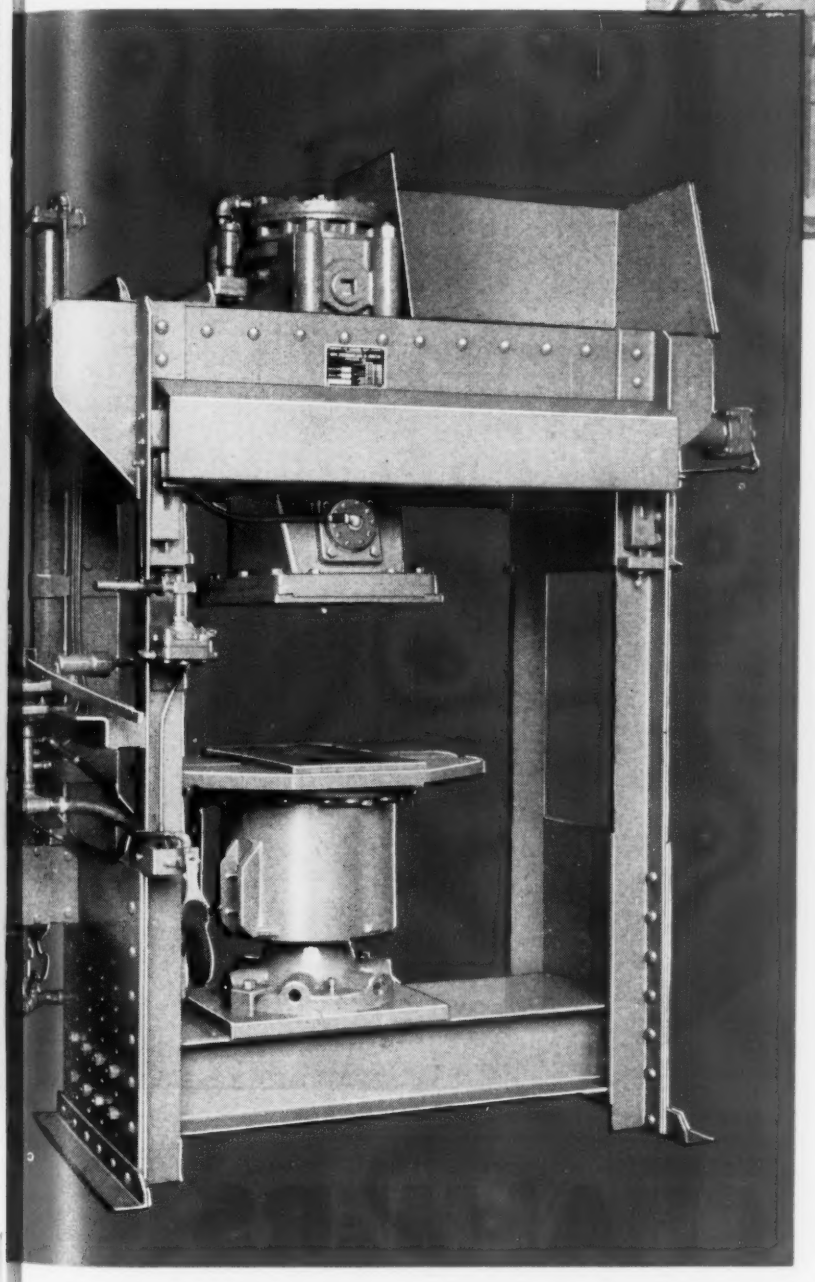
CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3813 *EAST 286th STREET* • *WICKLIFFE, OHIO*

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

When the Iron Horse was just a Colt

DEMMLER CORE BLOWERS WERE ALREADY FIRST

As early as 43 years ago foundrymen were looking to Demmler as the leading designer and builder of core blowers. And some of these original machines are still serving faithfully. What better proof can there be of Demmler dependability.



DEMMLER MODEL 2E

Typical example of dependable Demmler design is the Model 2E Core Blower. The 2E handles cores up to 20 pounds and is available with manual, semi-automatic or fully automatic controls. The draw cylinder is 14" in diameter and the machine has a 10" stroke.

Hard, chrome plated valve seats insure against rust and deterioration. The drawing post is completely enclosed, protected from sand and abrasion to guarantee accuracy and trouble-free operation. Ultra high speed blow valve action increases initial blow pressure 25% above other machines.

All parts of the machine are easily accessible for maintenance. The magazine exhaust valve is extra large and immediately exhausts air from magazine after the core is blown.

Demmler core blowers are now available with an optional new type magazine *guaranteed* to blow any mixture of foundry core sand, regardless of green strength or moisture content. Write to us for details about this outstanding new type magazine. In construction, design — in foundry performance, Demmler core blowers are unequalled for speed and dependability.

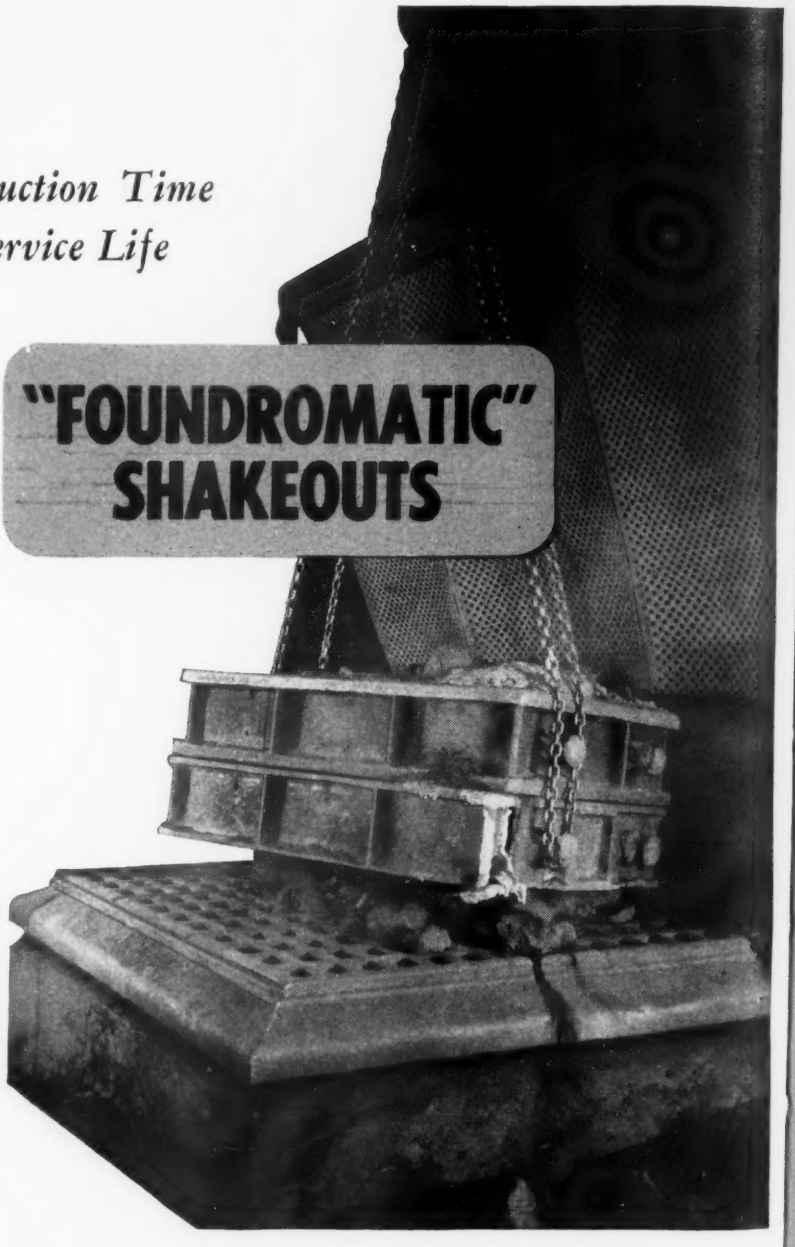
DEMMLER PRODUCTS INCLUDE: 23 different core blower models; vibratory sand feeders, core box vents; sand agitators and universal blow plates.

Write for literature

WM. DEMMLER & BROS., Kewanee, Illinois

CUT MAINTENANCE

Get More Shakeout Production Time
Plus Added Years of Service Life



YOU CONVERT maintenance time to production time when *Foundromatic* shakeouts handle your molds and castings. And the features that cut maintenance costs also add years to service life.

Take the simple two-bearing vibrating mechanism, for example. Since there are no bearings bolted to the foundation, impact loads can't damage either bearings or shaft. No shaft has ever broken from impact on a *Foundromatic* shakeout. Also, a double labyrinth grease seal assures positive protection against dust.

Foundromatic shakeouts are effectively isolated from foundations by resilient mountings. As a result, a *Foundromatic* shakeout installation is far less costly than that of older designs.

Get complete details by calling your nearest A-C district office, or write Allis-Chalmers, Milwaukee 1, Wis.

A-3937

Foundromatic, and Regulex are Allis-Chalmers trademarks.

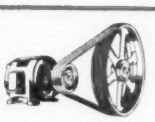
ALLIS-CHALMERS

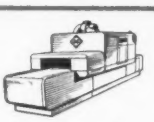
A-C ALLIS-CHALMERS

Foundry Equipment for Bigger Output—Better Working Conditions!

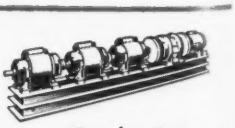
Vibrating Screens

Cupola Blowers

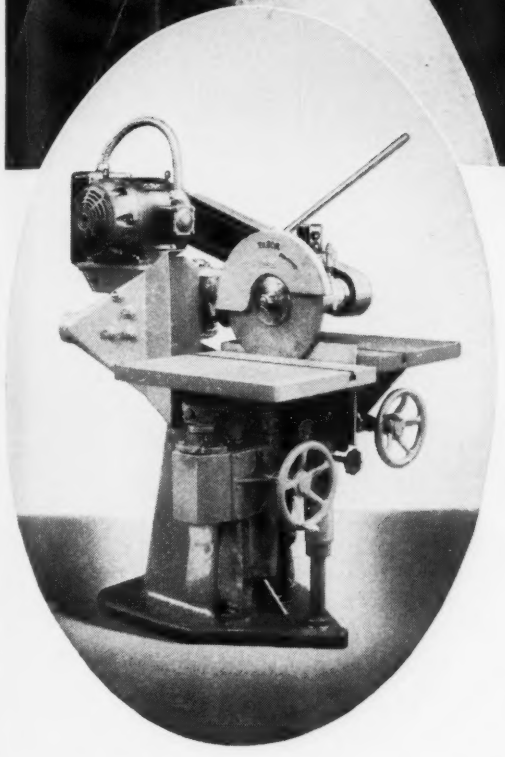

Motors-Drives Control


Foundromatic Core Dryer

Induction Heating & Melting


Regulex Arc Furnace Control

Through 21 sq. inches of manganese bronze in *10 Seconds!*



That's a mighty fast cut for a 16" wheel driven by a 10 H.P. motor—a good example of how top-speed production schedules are "meat" for Tabor-Brasive Cut-Off Machines.

These rugged machines cut gates and risers from non-ferrous and ferrous castings in a matter of seconds. Clean, close cuts, too, that slash snagging and finish-grinding costs to the bone—often do away with them entirely.

And for the *really tough* cutting jobs—in steel foundries—in copper cutting (either gates and risers or crucible feed stock)—wherever the going's the toughest, Tabor makes a big-value 15 H.P. cut-off.

Any way you look at it, a Tabor-Brasive Cut-Off Machine—equipped with today's hard-to-break, safe-to-use wheels—is *your* answer to more cuts at less cost, with safety.
Write, wire or 'phone for more details.

SPECIFICATIONS

Motor	Table Size (Split Type)	Wheel Diam.	Max. Height of Work Under Wheel
10 H.P.	36" x 25"	16" Max. Thickness—5/32"	20" (with head over table) 46" (with head swung to side)
15 H.P. (Two Speed)	41" x 30"	20" Max. Thickness—3/16"	18" (with head over table) 44" (with head swung to side)
All motors fully enclosed, fan-cooled, ball bearing			

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

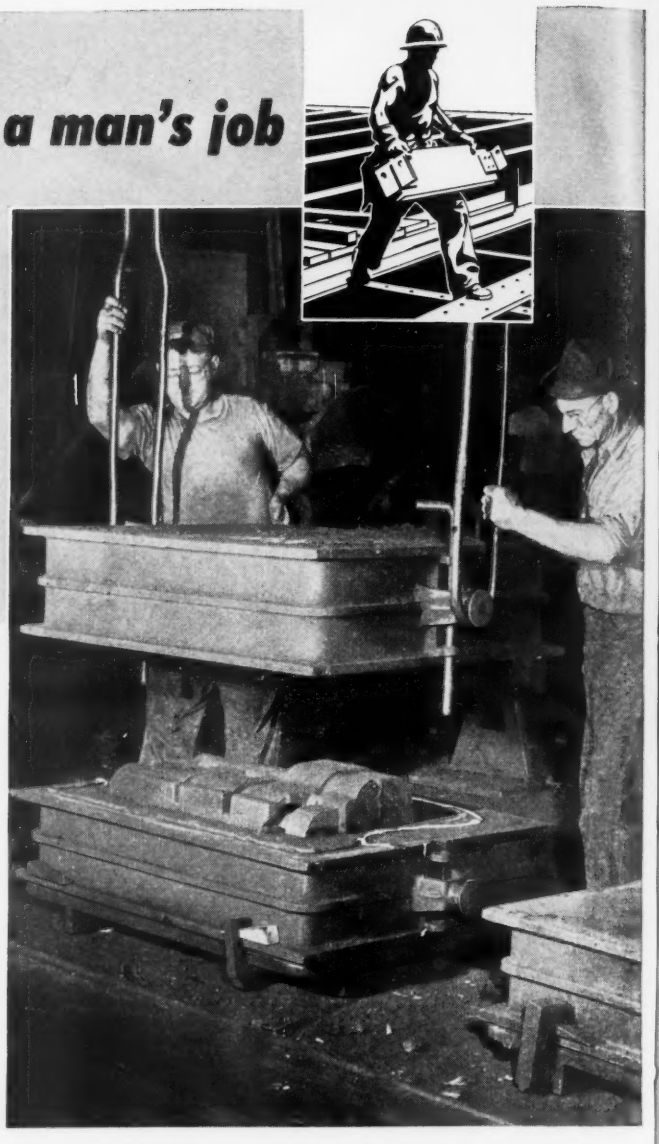
The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA.

You'd send a man to do a man's job
So, specify

BS&B
Heavy Duty
FOUNDRY FLASKS
for heavy, tough service



The only heavy duty foundry flask combining all these advantages is manufactured by BS&B

1. Welding of bearing strips continuously, both inside and out.
2. Cast steel trunnions.
3. Cast steel pinlugs and clamplugs.

Write for FREE BS&B Foundry Flask Handbook

A handy catalog and useful foundryman's "Bible" . . . includes valuable information on foundry flasks and easy-to-order system.

Foundry Flask Division, Dept. 7-AR2

A boy can't do the job of a man any more than a lightweight flask can do a foundry job calling for a heavier one. And there's a difference in heavy duty flasks, too! You may even find BS&B Foundry Flasks initial cost a little more; but their actual cost is low . . . low maintenance will soon make up the difference . . . you'll get years of economical service from these time-proven work horses. BS&B methods of corner forming of walls and bearings separately, plus welding bearings to walls, both inside and out, eliminates corner stresses, preventing the corners from cracking and breaking out. Production and maintenance records maintained by many foundries prove that BS&B Foundry Flasks pay for themselves many times over in the money and time they save on minimum maintenance.

FOUNDRY
OUR 60TH YEAR
BS&B
FLASKS

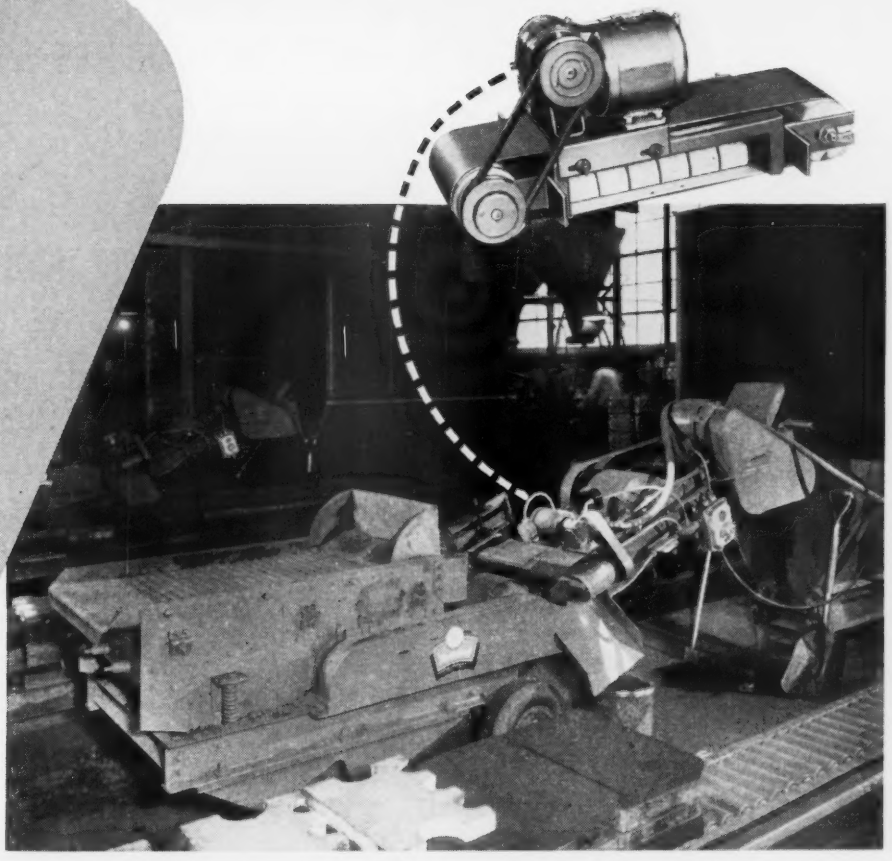
BLACK, SIVALLS & BRYSON, INC.

7500 East 12th Street Kansas City 26, Missouri

NEW WAY

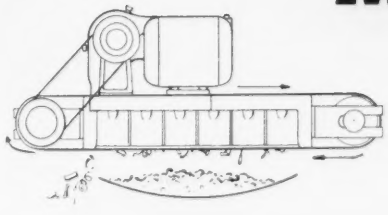
with

Dings



to prepare

screened, tempered, aerated and Magnetically Separated foundry sand . . .



Fully Automatic Magnet!

Cleans itself — Endless belt sweeps attracted iron to side, out of magnet range, where it is discharged. The Perma-Plate Magnet is non-electric—its strength is certified and guaranteed permanent. Send for Catalog C-1205-A.

NEWAYGO ENGINEERING COMPANY'S efficient REDDY SANDY units take the shoveling out of shakeout and sand preparation — take out the finest iron, too, when equipped with non-electric, self-cleaning Dings Perma-Plate Magnets.

Fine iron that might get through the REDDY SANDY'S shakeout screen is pulled to the face of this powerful Dings Alnico magnet, and discharged automatically.

Time and money is saved all the way down the line, because this Dings Magnet consumes no current, and cleans itself. Magnetic strength is certified — permanent forever.

You'll find Dings Magnets — pulleys, drums, lifting magnets, rectangular magnets and many others — at work in foundries everywhere.

When it's iron you want out — see your Dings representative. Write today for Bulletin C-5000-B describing the complete Dings line.

DINGS MAGNETIC SEPARATOR COMPANY

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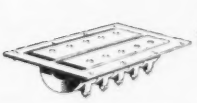
LIFTING MAGNETS

DINGS MAGNETIC PERMA-DRUMS



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USE DELTA CORE WASHES ... *Exclusively* AT THEIR FAMOUS SOUTH BEND FOUNDRY

Dry Dipping of jacket cores with DELTA GRAKOAT

Green dipping of barrel and crankcase cores with DELTA GRAKOAT

... FOR QUALITY, SPEED AND ECONOMY

DELTA GraKoat Wash ... (the original white plastic type wash developed by DELTA laboratories 18 years ago) has been used consistently by leading automotive and tractor foundries ever since it was first introduced.

Here are the reasons why:

1. EASY TO APPLY
2. MOISTURE PROOF
3. NO PRECIPITATION
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OTHER DELTA FOUNDRY PRODUCTS

CORE AND MOLD WASHES:

FOR ALL TYPES OF SAND CAST METALS: STEEL, GRAY IRON, MALLEABLE AND NON-FERROUS.

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PARTING COMPOUNDS

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MOLD SURFACE BINDERS-LIQUID

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96-B SAND RELEASE AGENT

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CORE ROD DIP OIL NO. 224X

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SAND CONDITIONING OIL

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A liberal working sample will gladly be sent to you, free of charge, at your request.

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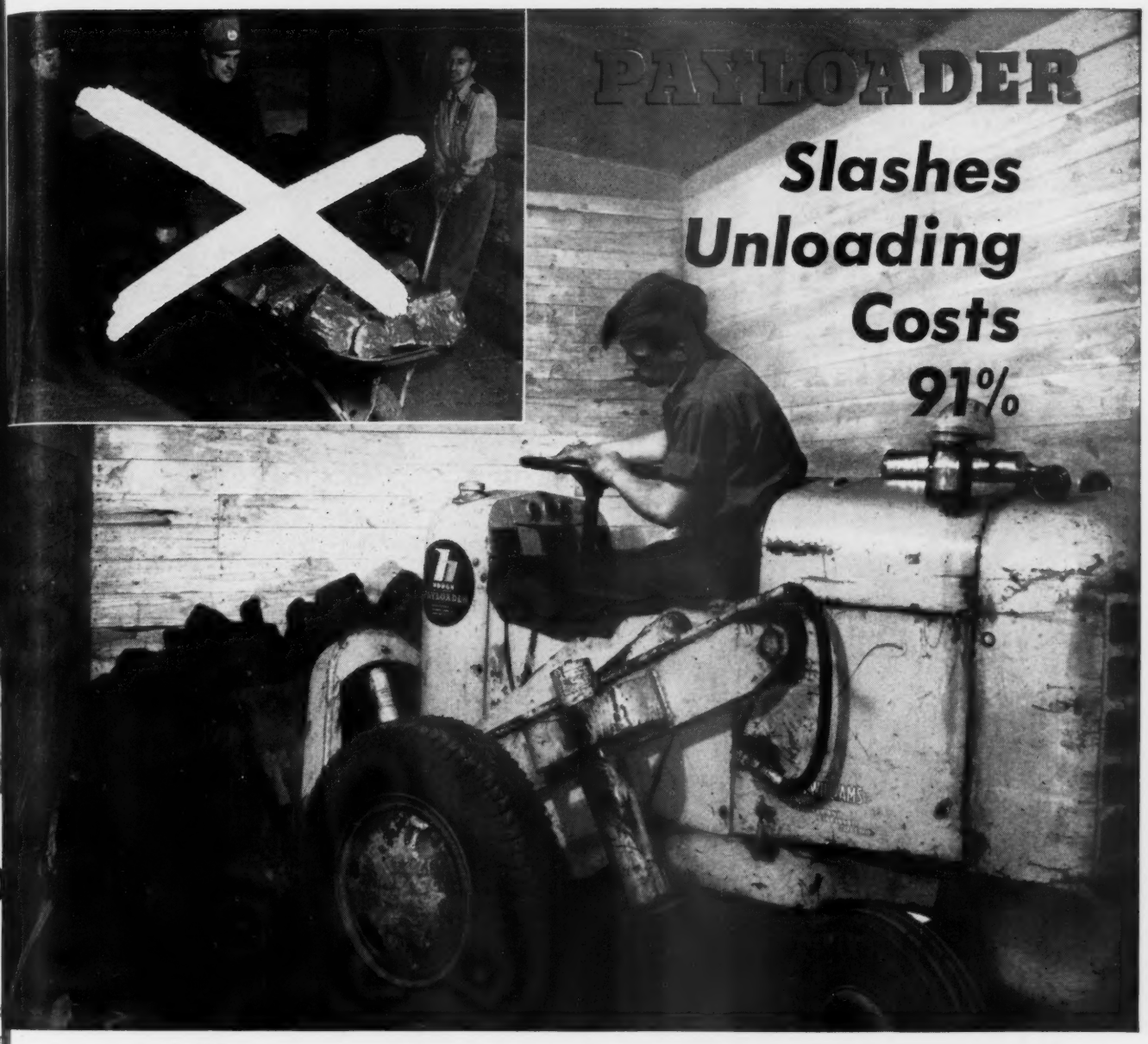


* A complete report on Timken's use of "PAYLOADERS" for bulk material handling is found in Vol. 1, No. 3 of INDUSTRIAL HANDLING. Copy of this is available for the writing. Literature on any of the "PAYLOADER" models is also available, without obligation: the 12 cu. ft. Model HA, the 15 cu. ft. Model HAH, the ½ yd. HE, the ¾ yd. HF, the 1¼ yd. HY or the big 4-wheel drive Model HM.

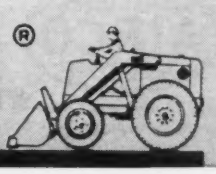
At Timken Roller Bearing Company,* three men, with hand shovels and wheelbarrows, used to work hard for 20 hours to unload a 50 ton car of heavy lump ferromanganese. Now, one man on the "PAYLOADER" tractor-shovel does the job easily in 5 hours — so that unloading time is reduced 75% and manhours are reduced 91%. This is only one example in hundreds where the "PAYLOADER" has effected amazing savings in time, labor, and costs . . . in loading, unloading, transporting, piling, spreading, and dumping all kinds of bulk materials.

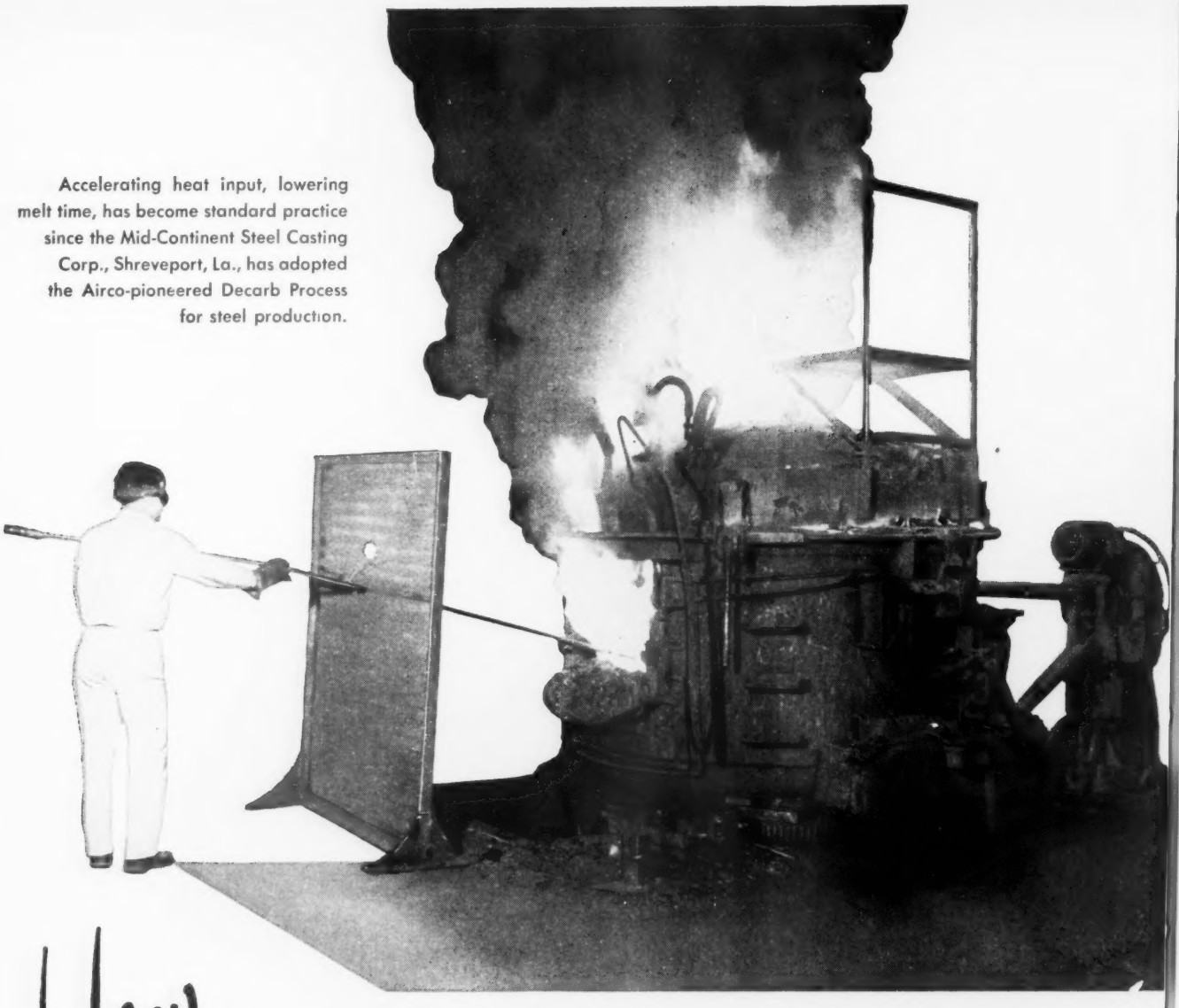
This distinctive tractor-shovel is completely Hough-built *expressly for tractor-shovel work,* with superior features that insure more production and satisfaction — such advantages as several speeds in BOTH directions, and large pneumatic tires that work on ground or floors. If *you* have bulk material handling problems "PAYLOADERS" can probably help you solve them. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Illinois.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. · *Since 1920*





Accelerating heat input, lowering melt time, has become standard practice since the Mid-Continent Steel Casting Corp., Shreveport, La., has adopted the Airco-pioneered Decarb Process for steel production.

How TO INCREASE STEEL PRODUCTION

use less power–save more time

WITH AIRCO'S STEEL DECARBURIZATION PROCESS

Oxygen injected under the slag cover at 80 psi has become the answer to Mid-Continent's faster steel production.

Increased bath temperature—faster carbon elimination—lower power consumption . . . time saved per heat . . . gives Mid-Continent a product with the same normal chemistry, slag control and fluidity as they formerly received using ore. Additional work-flow advantages are gained by the elimination of ore handling and storage problems.

Oxygen decarburization for faster heats may be put to work for you. The facilities of our Technical Sales Division may furnish you with the answers you need to know about this process for your use. If you are interested in obtaining further information, please address your nearest Airco office.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AN AIR REDUCTION PRODUCT

AIRCO®

DEALERS AND OFFICES IN PRINCIPAL CITIES

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY • AIR REDUCTION PACIFIC COMPANY

REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL

DIVISIONS OF AIR REDUCTION COMPANY, INCORPORATED

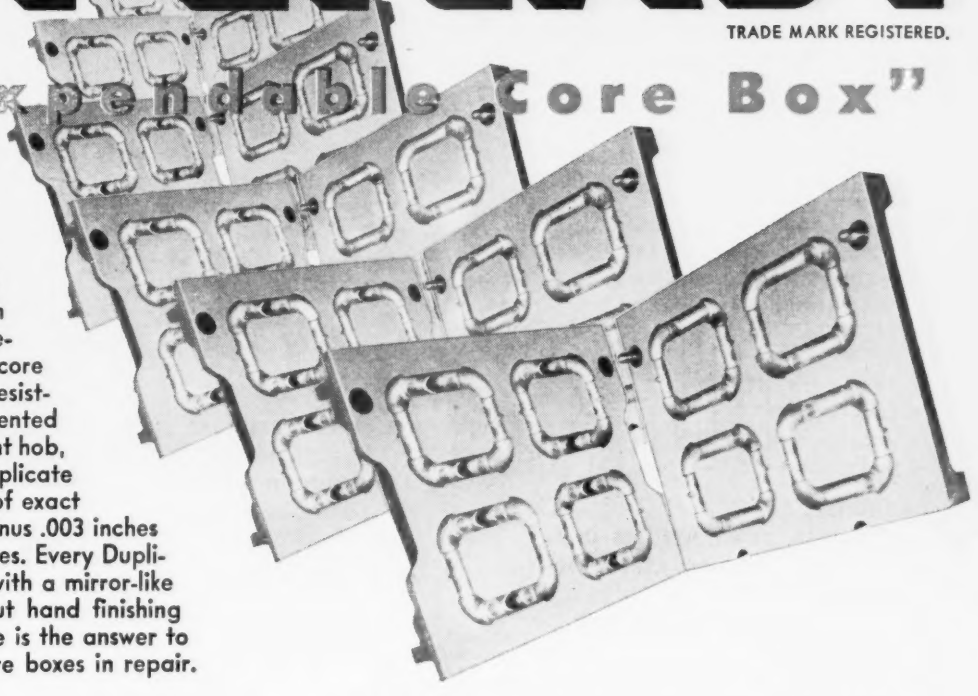
Save up to 80% on Core Box Replacement Costs!

NOW... Cheaper To Replace Than To Repair

DUPLICAST

TRADE MARK REGISTERED.

"The Expendable Core Box"



Duplicast is the ideal core box for high production schedules and for complicated irregular contoured shapes and cavities which otherwise are costly to replace or repair. Duplicast core boxes are made of a wear resistant aluminum alloy by a patented method in which a permanent hob, or mandrel, is used to duplicate any number of core boxes of exact dimensions within plus or minus .003 inches within a distance of 12 inches. Every Duplicast core box is produced with a mirror-like finish in the cavities without hand finishing or tooling of any kind. Here is the answer to the problem of keeping core boxes in repair.

HERE ARE THE ADVANTAGES OF DUPLICAST — *PROVEN IN PRODUCTION!*

- **Fins in castings are eliminated because of exact duplication of accurate core box cavities.**
- **Core production schedules uninterrupted because extra core boxes are on hand at all times.**
- **No sampling or checking is necessary when a new core box is put in production.**
- **There is substantial reduction in scrap.**
- **There is substantial increase in core production over cast iron boxes formerly used.**

FOR FURTHER INFORMATION — MAIL COUPON

Industrial Pattern Works
2625 Belmont Avenue—Chicago 18, Ill.

Gentlemen: I am interested in Duplicast and would like further information.

☐ Send Bulletin D-1. ☐ Have representative call.

Name_____ Title_____

Company_____

Address_____

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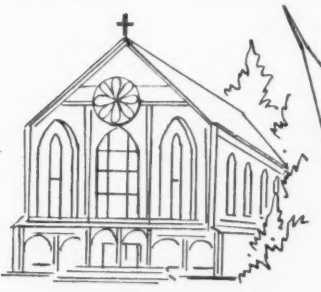
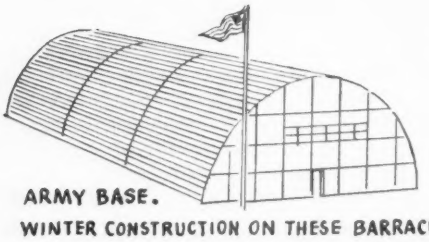
NOTES FROM AN ENGINEER'S SKETCH PAD

LOOKS LIKE THAT VERSATILE DRAVO "COUNTERFLO" HEATER CAN BE USED ON PRACTICALLY ALL OUR JOBS.

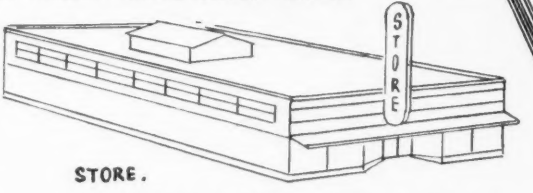
SCHOOL DISTRICT BUDGET LIMITED. CAN SAVE WITH DRAVO HEATERS.



CHURCH. INTERMITTENT HEATING. NEEDS QUICK PICK-UP. DRAVO HEATER CAN DO.

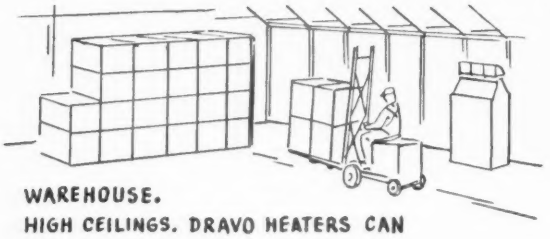


ARMY BASE.
WINTER CONSTRUCTION ON THESE BARRACKS. CAN INSTALL DRAVO HEATERS EARLY FOR HEAT DURING CONSTRUCTION AND AFTER COMPLETION.

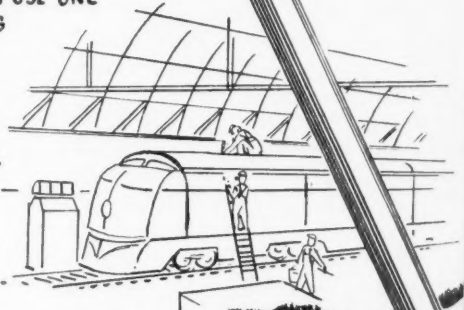


STORE.
WITH DRAVO HEATERS, CAN USE ONE SET OF DUCTS FOR HEATING AND AIR-CONDITIONING.

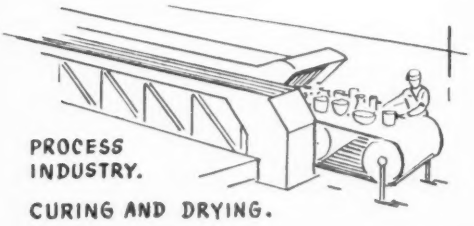
INDUSTRIAL PLANT.
DRAVO HEATERS HAVE 150' AIR THROW. NO DUCTS NEEDED.



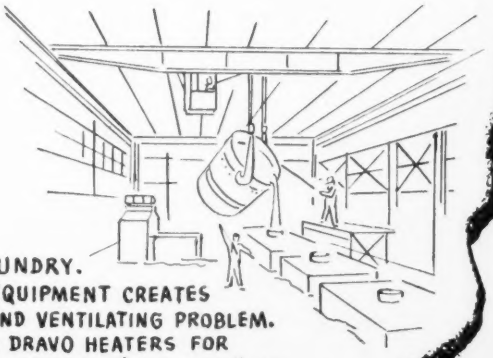
WAREHOUSE.
HIGH CEILINGS. DRAVO HEATERS CAN REDUCE ROOF HEAT LOSS, KEEP HEAT WHERE IT'S NEEDED.



DIESEL RAILROAD SHOP.
NEEDS HEAT AT WORKING LEVEL. DRAVO HEATERS IDEAL.



PROCESS INDUSTRY.
CURING AND DRYING. SPECIFY DRAVO HERE.



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EXHAUST EQUIPMENT CREATES HEATING AND VENTILATING PROBLEM. USE DRAVO HEATERS FOR TEMPERED "MAKE-UP" AIR.

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...w Dravo.

A case study on any ... installations is yours for the asking. For complete information on how Dravo "Counterflo" Heaters can help solve your heating problems, write for Bulletin LM-526-354

DRAVO CORPORATION

HEATING DEPARTMENT, DRAVO BUILDING, PITTSBURGH 22, PA.

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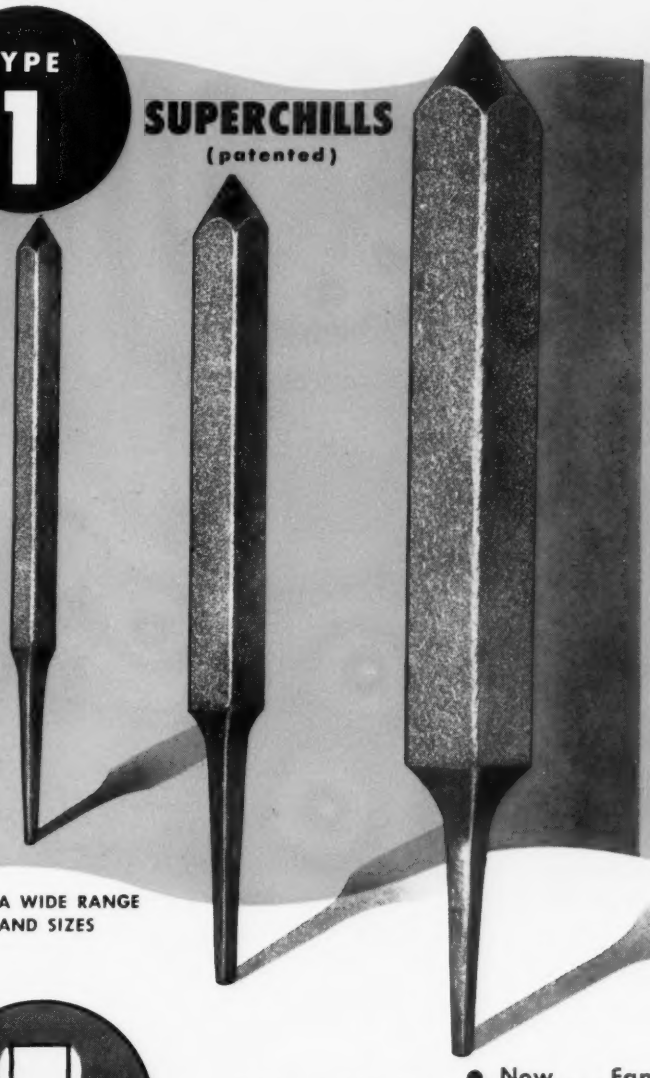
Now 3 fine FANNER CHILLS

designed to meet particular requirements

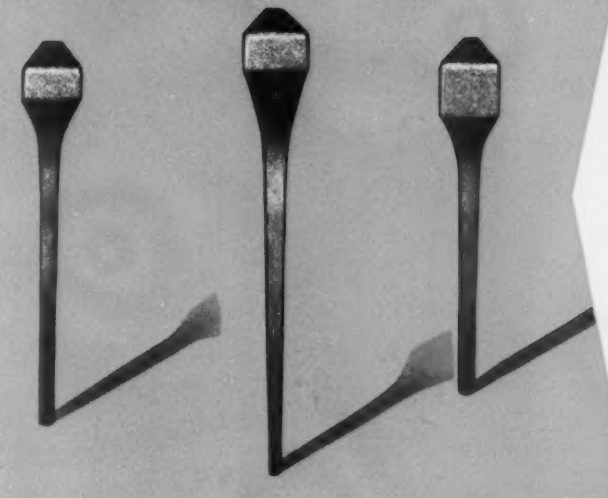
for *Greater* chill efficiency... *Better* metal flow... *Sounder* castings

TYPE 1 **SUPERCHILLS** (patented)

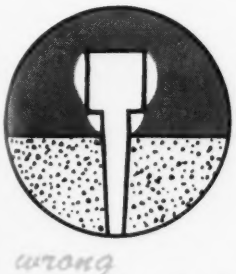


MADE IN A WIDE RANGE OF TYPES AND SIZES

TYPE 2 **SUPERCHILLETS** (patented)



FORM "C" FORM "D" FORM "E"



wrong square-headed chill nails do not conform to flow of metal, allow "pockets" and blow holes to form, and cause defects in castings.

● Now . . . Fanner offers three special types of FINE FANNER CHILLS designed to result in better, sounder castings *every* time. Fanner Superchills and Superchillets illustrated above prove superior in the pouring operation because they are engineered to the smallest detail. Surfaces are correctly tapered, gases are free to flow along surfaces as fast as generated before they can be pocketed. These new chills provide: better surfaces for molten metal to contact, and more chilling volume per pound. They are not "off-shoots" or by-products but are scientifically designed to produce proper chilling at lowest cost without "blows" . . . with "kicking-away" . . . and without sharp shoulders. SUPERCHILLS and SUPERCHILLETS are available in a wide range of sizes and shapes. Write for samples and prices today.

right correctly tapered head of new FANNER chill nails conforms to flow of metal, eliminating pockets, allow gases to escape and result in sound castings.

See 3 on other side

THE FANNER MANUFACTURING COMPANY

designers and manufacturers of Fine Fanner Chills

BROOKSIDE PARK CLEVELAND 9, OHIO

fine FANNER CHILLS

TYPE 3

FANCHILLETS

Fanner Fanchillets are another type of Fine Fanner Chills which provide greater chilling efficiency at lower cost through engineering design. Instead of the conventional square head, the Fanchillet has its sides tapered toward the top to properly chill a given area. Thus, gases are free to flow along surfaces as fast as generated before they can be pocketed; metal completely envelopes the head and proper cooling is effected at the same time . . . so that casting is free from otherwise produced defects. In addition, these Fine Fanner Chills cost you less per pound than the price per pound for which you sell the finished casting.

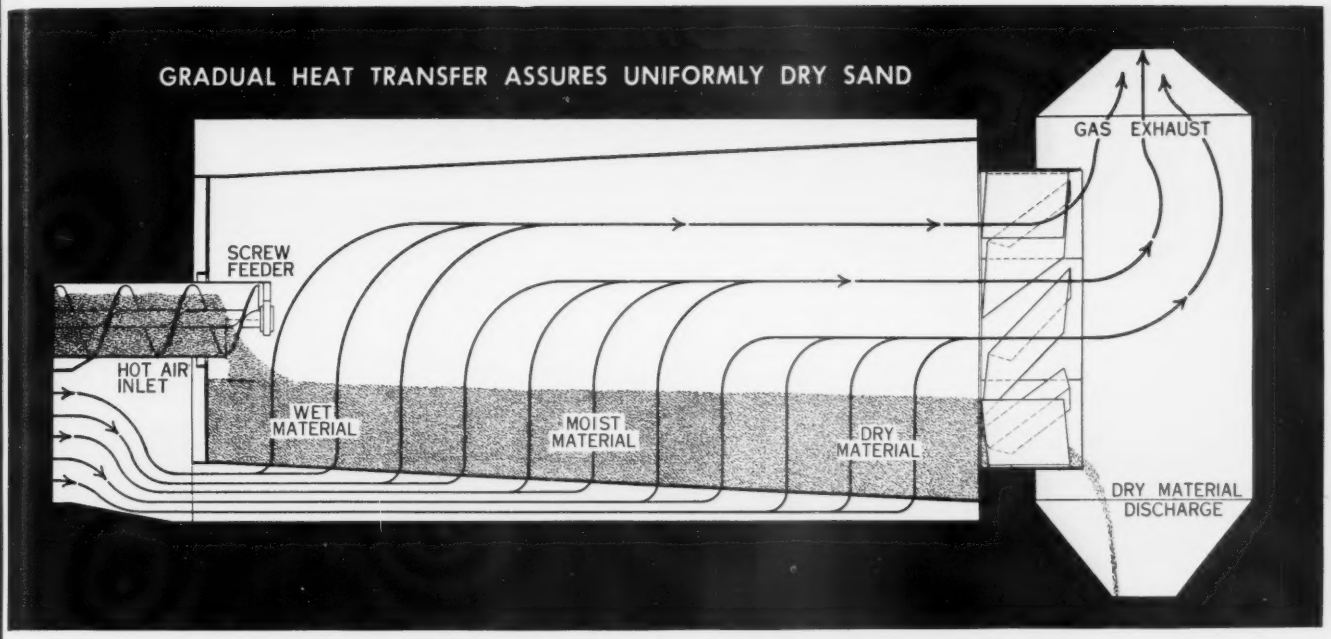
Fanchillets are available in a wide range of sizes and shapes. Write for samples and prices today. A great variety of other types of Fine Fanner Chills are shown in the new Fanner Chill Catalog. Send for your copy.

See 1 and 2 on other side

THE FANNER MANUFACTURING COMPANY

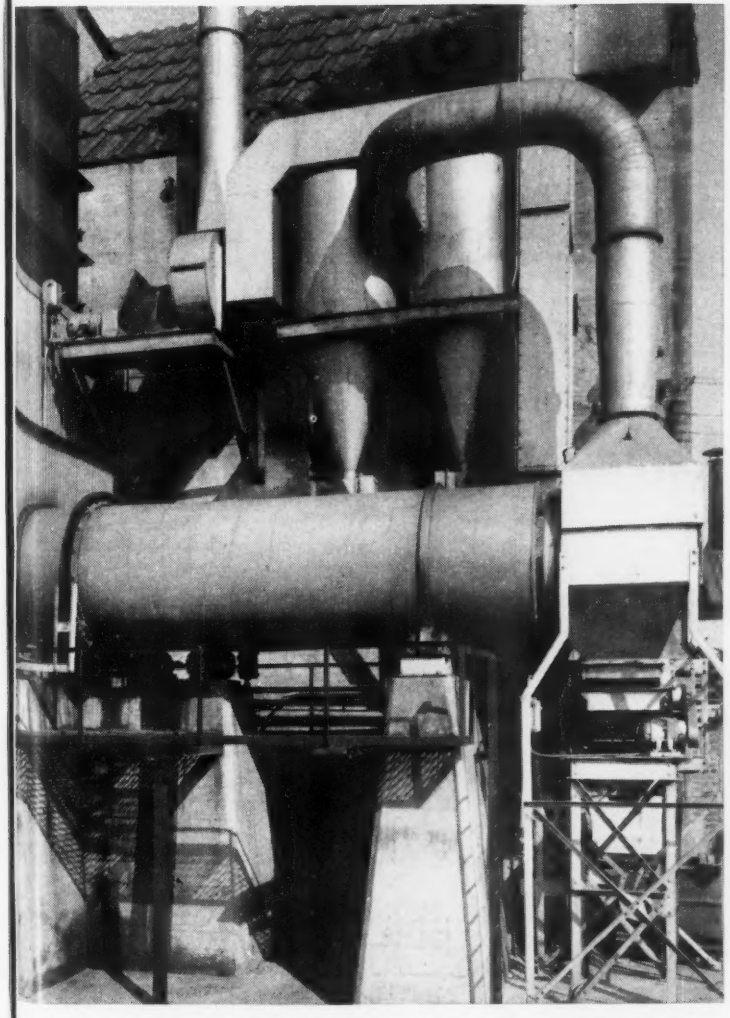
designers and manufacturers of Fine Fanner Chills

BROOKSIDE PARK CLEVELAND 9, OHIO



Gentle rolling action over slowly revolving louvres results in uniform treatment, thereby eliminating spotty over- or under-drying. Gradual drying of sand, as it progresses through the Roto-Louvre Dryer, affords a uniform moisture content of the product at a low final temperature.

Dry sand means better castings



At a Detroit automotive foundry, Link-Belt Roto-Louvre Dryer reduces moisture content of 10 tons of sand per hour from 6.0% to 0.5%.

Space-saving LINK-BELT Roto-Louvre Dryer delivers large volumes of dry sand... at cool discharge temperatures

For uniform mixing, core and molding sands must be dry. And the sand must also be cool enough to blend properly with core oil. On both counts, Link-Belt Roto-Louvre Dryers offer unique advantages.

Sand is delivered with a uniform moisture content of 0.5% and at a uniformly low discharge temperature. Equally important, Roto-Louvre does this without the assistance of an extra cooler . . . requires only half as much floor space as other drying equipment.

Link-Belt builds eight sizes of Roto-Louvre Dryers—in capacities from 1 to 60 tons per hour. Get complete information from the Link-Belt office near you, or write direct for new Book 1911-B.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

LINK-BELT

HANDLING and SAND PREPARATION MACHINERY

LINK-BELT COMPANY Plants: Chicago, Indianapolis, Philadelphia, Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 12.949

USCO T

For 48 years, pioneers in aluminum development.

35000 LBS. TENSILE STRENGTH ...WITHOUT HEAT TREATMENT!

USCO T is the high-tensile aluminum alloy that gives you physical properties usually obtainable only by heat treating—without this delay and costly extra step.

USCO T can be cast in both sand and permanent mold. Typical properties in sand after two weeks natural aging are 35000 T. S., 25000 Y. S., 5% elongation and 74 Brinell. The elimination of heat treating minimizes warpage problems.

USCO T is available now for prompt shipment. For further information on this exceptional time and money saving aluminum alloy contact your USCO representative now or write us direct.

FREE —Send for your USCO Aluminum Alloy Selector. A handy guide to analysis, specifications and many other foundry problems.

USCO

U. S. REDUCTION CO.

East Chicago, Indiana

PLANTS: EAST CHICAGO, INDIANA • TOLEDO, OHIO

MECHANIZE MATERIALS HANDLING

WITHOUT COSTLY INSTALLATIONS OR LOSS OF PRODUCTIVE TIME

use an Allis-Chalmers HD-5G and Tracto-Shovel Attachments

You speed materials handling "right now" when you put this fast-working tractor-shovel combination on the job. The HD-5G starts boosting production without waiting for costly installations or changes in plant layout. Digs into the toughest jobs, indoors or out . . . lifts, loads, excavates, pushes, tows...handles all materials, bulk, solid or packaged.

And it works easily in close quarters — turns in its tracks . . . has no bulky, overhead structure. Outdoors, the track-type tractor is not bothered by weather or ground conditions . . . works the year around, even in unpaved yards.

Choice of thirteen interchangeable Tracto-Shovel attachments makes the HD-5G a one-tractor material handling fleet. Special buckets, lift fork, crane hook, rock fork, 'dozer blades and others may be interchanged in a few minutes with simple tools.

Write for descriptive literature on the full line of Tracto-Shovels from 1 to 4 cu. yd.

LIFT FORK ATTACHMENT
Stacking Height (under forks) - - 106 in.
Lifting Capacity - - - - - 4,000 lb.

CRANE HOOK
Lifting Height (hook to ground) - - 138 in.
Lifting Capacity - - - - 5,000 lb.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

HD-5G THE MODERN TRACTOR IN EVERY WAY
Designed For Your Job • Built To Take It • Easy To Service
Easy To Operate
40.26 drawbar hp. • 1 cu. yd. bucket
Dumping height — 9 ft., ¼ in.

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Deoxidation Studies Show Advantages of Silicomanganese

Silicomanganese has proved to be highly efficient and economical as a furnace block and deoxidizer, as well as an alloy addition. Steel producers have found that it saves furnace time, produces cleaner steel, and increases the yield of rolled products.

Excellent Blocking Addition

When used as a blocking addition, silicomanganese stops the carbon-oxygen reaction in the open-hearth furnace and permits close control of analysis. The alloy has a ratio of approximately 3.5 manganese to 1 silicon. This proportion will produce a high degree of deoxidation in the furnace.

Why Silicomanganese Is Effective

The carbon boil is arrested more positively by this combination alloy, containing both silicon and manganese, than it is by larger amounts of silicon alone. As a result, close control of the carbon level can be maintained. Also, because of the low carbon content of silicomanganese, the heat may be blocked at a comparatively high carbon level. This saves furnace time, which is critical in reducing costs. Since silicomanganese gets more oxygen out of the bath than silicon alone, the steel is cleaner and has improved surface quality.

Metallurgical Studies Made

Work done by Herty and his associates (1) showed that manganese tends to flux silica inclusions resulting from deoxidation, and permits them to grow in size so that they float out of the bath more rapidly.

More recently, it was found by Hilty and Crafts (2) that manganese and silicon in combination lower the oxygen content much more than silicon alone (see Fig. 1). They also determined that, although manganese by itself is not a strong deoxidizer, it substantially intensifies the deoxidizing power of silicon.

It was shown that in steels with lower silicon contents (below 0.05 per cent), manganese in the amounts usually present as a residual has a strong influence. However, in the silicon range normally used for deoxidation (0.05 to 0.25 per cent), more manganese is required to obtain the full benefit of the combined deoxidizers. For example, at 1600 deg. C, iron with 0.10 per cent silicon and 0.10 per cent or less manganese contains about 0.017 per cent oxygen. With 0.50 per cent manganese, it contains only 0.009 per cent oxygen (see Fig. 1).

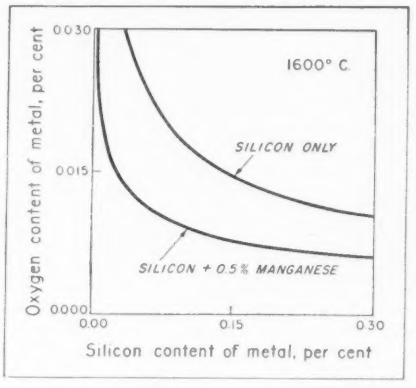


Fig. 1. Limit of solubility of oxygen in iron-silicon alloys, plain and with 0.50 per cent manganese at 1600 deg. Centigrade.

These data thus confirm an observation made by Tenenbaum and Brown (3) that steel as tapped from the furnace is materially lower in oxygen after blocking with silicomanganese.

In another study, made by Silliman and Forsyth (4) it was demonstrated that heavier than usual additions of silicomanganese result in a marked improvement in surface quality. About twice the usual addition of silicomanganese gives a substantial increase in the yield of finished product.

Silicomanganese Produces Cleaner Steel

Initial deoxidation in the furnace with silicomanganese produces very clean steel, particularly in grades below 0.25 per cent carbon. Several factors contribute to the cleansing action of silicomanganese. The amount of dirt in steel seems to be proportional to the maximum oxygen content prior to final deoxidation. Heats that are oxidized to a low carbon and recarburized, as were early rail and forging steels, are dirtier than those in which the carbon is "caught on the way down."

It is also well recognized that medium-manganese and low-carbon steels that are blocked at higher carbon (lower oxygen) contents, with low-carbon ferro-alloys, are cleaner than those taken to a lower carbon level and recarburized with high-carbon ferro-alloys. Silicomanganese is low enough in carbon to block at higher carbon levels. As pointed out by Tenenbaum (5), there is also a decided economic advantage in not driving to such low carbon contents before blocking.

Suitable For Ladle Additions

In addition to its use as a bath deoxidizer, silicomanganese has proved particularly effective as a ladle addition for the deoxidation of semi-killed steels. The alloy is also used to provide the complete ladle addition of manganese in the manufacture of medium-manganese, acid-steel castings.

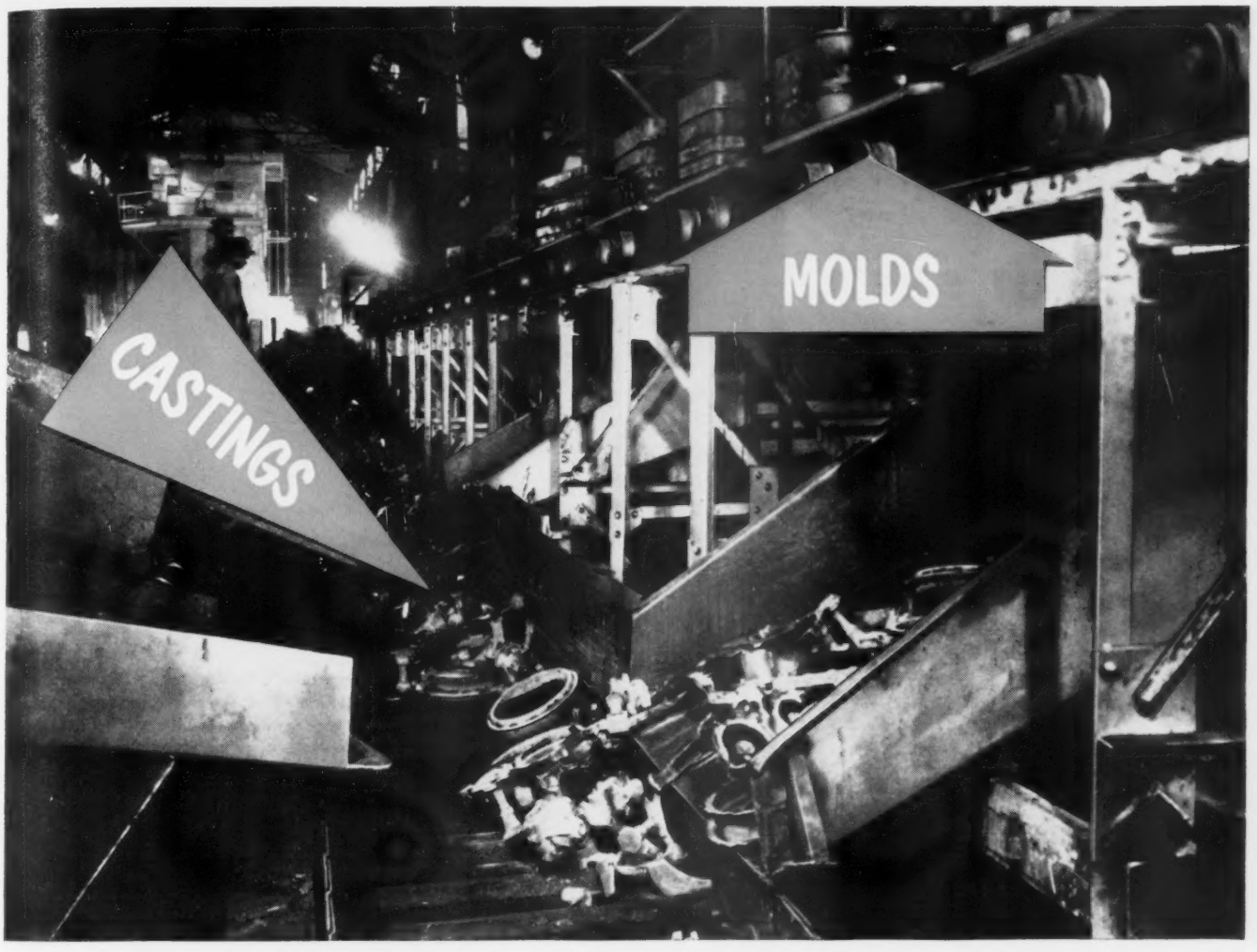
Metallurgical Service Available

Our metallurgists will be glad to help you with the use of ELECTROMET silicomanganese. This alloy contains 65 to 68 per cent manganese, and is produced in maximum 1.50, 2.00, and 3.00 per cent carbon grades. All grades are furnished in a lump size of 75 lb. x 2 in. and in a crushed size of 2 in. x down. If you wish further information, please write, wire, or phone the nearest ELECTROMET office: in Birmingham, Chicago, Cleveland, Detroit, Houston, Los Angeles, New York, Pittsburgh, or San Francisco. In Canada: Welland, Ontario.

References

1. C. H. Herty, Jr., C. F. Christopher, M. W. Lightner, and H. Freeman: "The Physical Chemistry of Steelmaking: Deoxidation of Open-hearth Steel with Manganese-silicon Alloys." U. S. Bur. of Mines, Carnegie Tech. and Min. and Met. Advisory Boards, Coop. Bul. 58, 1932.
2. D. C. Hilty and W. Crafts, "The Solubility of Oxygen in Liquid Iron Containing Silicon and Manganese," Trans. AIME, 188, 1950, pp. 425-436.
3. M. Tenenbaum and C. C. Brown, "The Total Oxygen Content of Plain Carbon Open-hearth Steel During Deoxidation and Teeming," AIME 162, 685-705, 1945.
4. L. R. Silliman and H. F. Forsyth, "Deoxidation vs. Surface Quality," Open-hearth Proceedings, 32, 1949, pp. 218-224.
5. M. Tenenbaum, "The Economic Aspects of Deoxidation," Open-hearth Proceedings, 28, 1945, pp. 349-352.

The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.



ON THE MOVE...

The way in which Jeffrey mold and casting conveyors work together results in one of the most up-to-date methods of transportation in use in the modern foundry today. Generous in capacity, Jeffrey Mold and Casting Conveyors move right along. They characteristically do a job of cost lowering in this completely mechanized foundry.

You'll like Jeffrey Foundry equipment . . . the way each unit is engineered for the job it is to do . . . the way our engineers help you determine the best arrangement suited to your operations. It all adds up to a smooth-running system . . . more profits for you. May we hear from you?

• • •

Aerators	Cleanarators	Flask Fillers
Bucket Elevators	Crushers	Paddle Mixers
Chains	Conveyors	Screens
Clamshell Valves	Disintegrators	Sanditioners
	Feeders	

THE JEFFREY MANUFACTURING COMPANY

907 North Fourth St., Columbus 16, Ohio

Material Handling, Processing and Mining Equipment

Baltimore 2 · Boston 16 · Cincinnati 2 · Detroit 13 · Houston 2 · New York 7 · St. Louis 1
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Birmingham 3 · Chicago 1 · Denver 2 · Harlan, Ky. · Milwaukee 2 · Pittsburgh 22

... Co. Ltd., Montreal, Canada — The Galion Iron Works & Mfg. Co., Galion and Bucyrus, Ohio
...ey-Diamond Ltd., Wakefield, England — Galion (Great Britain Ltd.), Wakefield, England
... (Pty.) Ltd., Johannesburg, S. A. — The Ohio Malleable Iron Co., Columbus, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

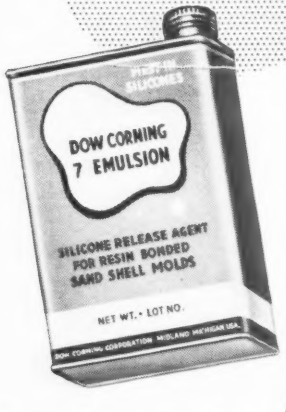
CUT SHELL MOLDING COSTS

use

DOW CORNING 7 EMULSION

Shell-O-Matic Corporation's President E. H. Rubovitz of Newark, New Jersey, demonstrates pattern-spraying technique with Dow Corning 7 Emulsion. The mobile, economical Shell-O-Matic requires only 18 square feet of floor space to put precision sand shell molding on a shell-a-minute production basis. Compact and self-contained, the unit features a built-in air compressor, strip pattern heaters, an infrared curing oven and automatic shell ejector. Maximum shell capacity: 12"x18"x6".

. . . the silicone parting agent that assures clean, positive release of shell molds and cores at minimum cost.



Whether you're using manual equipment or a machine for maximum production economy, you'll save money by specifying Dow Corning 7 Emulsion to give fast, clean release of resin bonded, sand shell molds. This noncorrosive, nonflammable silicone emulsion cannot break down at molding temperatures to leave a carbonaceous deposit on even the most complex patterns.

That reduces your pattern cleaning costs to a minimum; gives you faster, more continuous production of shell molds with uniformly high dimensional accuracy. And that enables you to deliver what the metal working industry has learned to expect of the shell process; finished parts with a minimum amount of machining.

Easily diluted with water to any desired concentration, Dow Corning 7 Emulsion is safe, easy and economical to use. For more information and a free trial sample, fill in and mail this coupon today.

Send for sample TODAY

DOW CORNING CORPORATION, Dept. AH-2
Midland, Mich.

Please send me
- ☐ Free sample of Dow Corning 7 Emulsion
- ☐ Data on Silicone Release Agents for the Shell Process

NAME _____

COMPANY _____

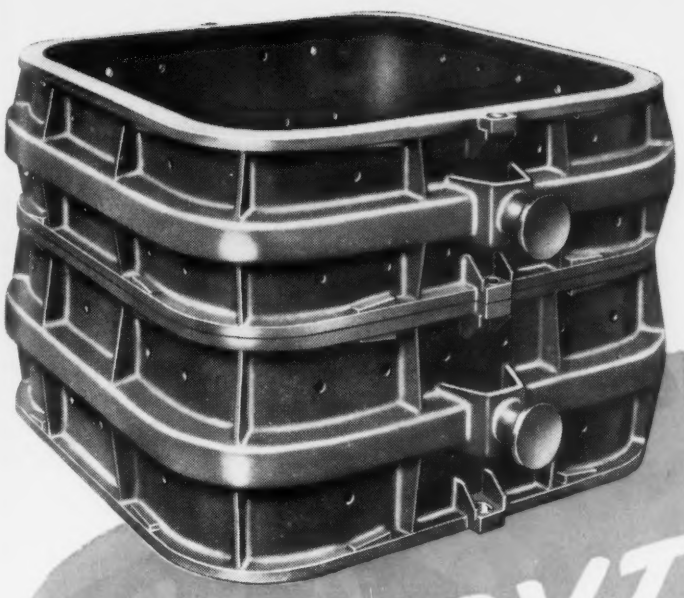
ADDRESS _____

_____

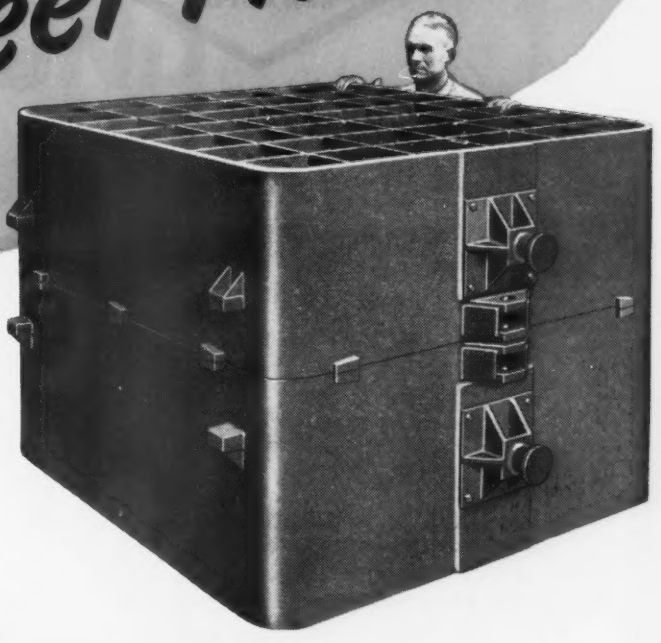
DOW CORNING MIDLAND **RATION**

ATLANTA CHICAGO CLEVELAND DALLAS LO

In Canada: Fiberglas Canada Ltd., Toronto In

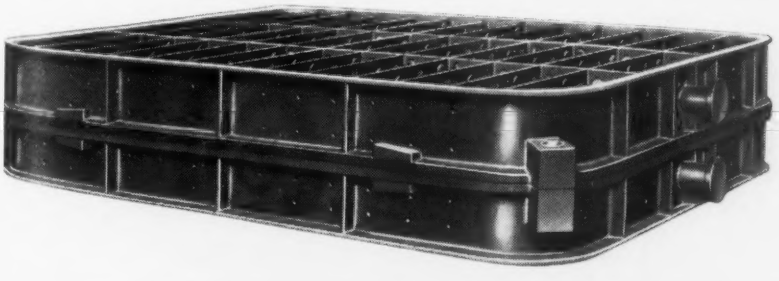


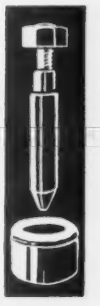
EVERYTHING in Steel Flasks



If you have a casting problem which requires a Flask of special shape or unusual construction —call your Shanafelt representative. He will check over the requirements with you and arrange for engineering detail and price quotations on Flasks made exactly the way you want them.

The four illustrations are typical of many special Flasks which were engineered and built here to meet special casting conditions.





Shanafelt Pins and Bushings are made solely for Foundry Flasks. The steel analysis, the tolerances and shapes, the degrees of hardening, are all based on the known requirements of Flask handling. You'll get a correct line-up of cope and drag if your Flasks are equipped with accurate, long wearing Shanafelt Bushings and Pins.

The SHANAFELT Manufacturing Co.

Serving the Foundry Industry for 57 Years

2600-2700 WINFIELD WAY N. E. • CANTON, OHIO

After years of research **CASTFLUX** *announces the successful development of*

CASTFLUX
Trade Mark Reg.

M-I-D

CASTFLUX
Trade Mark Reg.

SB-10 the 'national' DUAL PURPOSE FLUX

IN THE LADLE . . . SB-10 increases fluidity materially by cleansing and purifying the metal, bringing to the surface occluded oxides, gases, slag, dirt, etc., offsetting the negative factors of inferior scrap and coke.

AS A 'HOT TOPPING' . . . SB-10 prevents oxidation by keeping molten steel down into the main body of the ingot, greatly reducing volume of piping and saving a substantial amount of metal. There is no carbon segregation or pickup.

ON BLIND AND OPEN RISERS . . . SB-10 raises the temperature of the metal to a higher degree and substantially increases and maintains the fluidity of the metal during the entire cooling-down period.

Selling Agents and Distributors of Castflux:

St. Louis, Mo.
M. A. BELL CO.
with Branches in Houston, Texas and Denver, Colo.

Vancouver, B.C., Canada
INDUSTRIAL SUPPLIES LTD.

Montreal, Quebec, Canada
NEWMAN FOUNDRY SUPPLY LTD.

Detroit, Michigan
NATIONAL FOUNDRY SAND CO.

Dayton, Ohio
THE FENTON FOUNDRY SUPPLY CO.

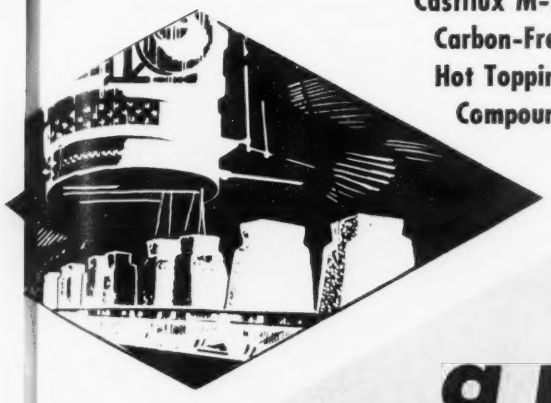
Elmira, New York
F. F. SHORTSLEEVE CO.

Seattle, Washington
WESTERN FOUNDRY SAND CO.

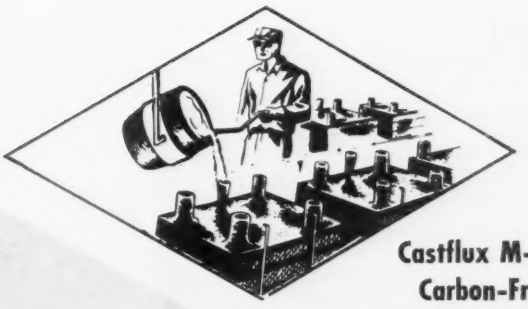
Portland, Oregon
WESTERN INDUSTRIAL SUPPLY CO.

Los Angeles, California
SNYDER FOUNDRY & SUPPLY CO.

CASTFLUX **NATIONAL pigment c**



Castflux M-10
Carbon-Free
Hot Topping
Compound



Castflux M-10
Carbon-Free
Riser Compound

a new CARBON-FREE HOT TOPPING AND RISER COMPOUND

used on steel and malleable castings and ingots

Years of laboratory research and months of actual field testing have proven the superiority of CASTFLUX M-10 over most hot topping or riser compounds on the market today. The CARBON-FREE contents of M-10 once and for all precludes any carbon pickup, segregation or contamination in any steel or steel alloys, and permits the control of carbon content in your metal without variation.

Depending on the size of the head, various tests have shown as much as 25% reduction in the depth of the piping, resulting in more solid metal in your ingot.

CASTFLUX M-10 will feed more riser metal into the main body of the casting and materially reduce any undesirable shrink, both internal and over-all.

As a ladle covering, CASTFLUX M-10 retains the pouring temperatures of the metal for a far longer period, thus permitting short pouring, and substantial saving of remelt metal.

CARBON-FREE CASTFLUX M-10 with all the improvements and the many advantages is still only priced the same as CASTFLUX SB-10.

That CARBON-FREE CASTFLUX M-10 will increase the yield and improve production at considerable savings has been conclusively proven. You, too, will benefit by a test-trial.

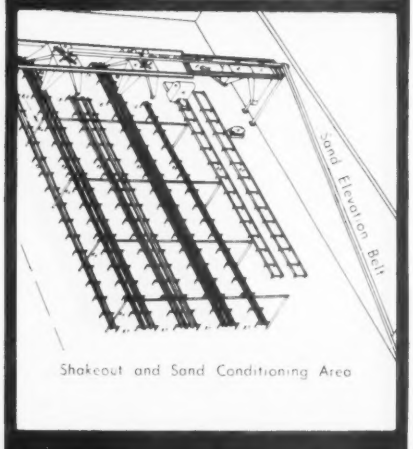
unconditionally GUARANTEED

Unless Castflux meets with your full approval, material can be returned at no expense within 30 days.

C[illegible] C. ORTHODOX ST. AT DELAWARE RIVER, PHILA. 37, PA.

Westover ENGINEERS
FOUNDRY MANAGEMENT CONSULTANTS
3110 W. FOND DU LAC AVE., MILWAUKEE 10, WIS.

NOMAD
CONVEYOR SYSTEMS



Shakeout and Sand Conditioning Area

Illustration of conveyors serving 8 Squeezer Molding Stations. Note position of Sand Hoppers

LOW COST MECHANIZATION BOOSTS PRODUCTION

The trend in recent years has been toward mechanization — however, until NOMAD FOUNDRY EQUIPMENT was patented and marketed, the cost of conveyor equipment prevented the small and medium size foundry from considering it as a means of increasing production.

With an eye to accommodating requirements of this group as well as larger shops in the industry, we designed a SELF-CONTAINED AND SELF-SUPPORTED FOUNDRY UNIT. The unit consists of LIGHT WEIGHT BUT STURDY GRAVITY MOLD CONVEYORS, ROLLER-MOUNTED BOTTOM BOARDS OR PALLETS, AND A SAND DISTRIBUTION SYSTEM. The various items are of standardized basic design which can readily be adapted to the requirements of a given installation. A choice of the items can be as extensive or as limited as desired.

NOMAD FOUNDRY EQUIPMENT ENGINEERS are available to assist in laying out the equipment for you to make the most efficient use of your facilities. . . .

Write for information or literature TODAY.

Manufactured by
NOMAD FOUNDRY EQUIPMENT
DIVISION OF
WESTOVER ENGINEERS
3110 W. FOND DU LAC AVE.
MILWAUKEE 10, WIS.

Readers' COMMENT

The Malleable Conference

TO THE EDITORS:

I want to express my appreciation for the generous coverage you gave the Malleable Founders' Society Supervisory Development Conference in the December issue of FOUNDRY.

With the complete outline of the program and the detailed account of each speaker's remarks, certainly the next best thing to being present at the meeting is the reading of FOUNDRY's report.

On behalf of the committee and myself, I wish to express thanks to all of those concerned with this excellent job.

W. J. MACNEILL
Vice President
Badger Malleable & Mfg. Co.
South Milwaukee, Wis.

* * *

It's Not "Grey" Iron

TO THE EDITORS:

After clearing off the snow yesterday morning, I rather hibernated but did do some intensive reading. Frankly, I was astounded at the phenomenal December 1952 issue of FOUNDRY. This paper has been becoming progressively better and for a culmination for 1952 your December issue is something to wave the flag about.

This morning I had our accident frequency rate checked up against the figures given in your editorial "It's Up To The Boss." Our frequency rate for the first quarter of 1952 was 11.16. You are quite right in your answer to safety and hygiene work. Top management must insist that everyone in the organization participates, and it is a never ending program.

Of course I could not write a letter of commendation without leveling it off with some sort of gripe. I do get terrifically upset when I see in FOUNDRY magazine gray iron castings spelled with an "e" instead of an "a". I note in the December issue a number of ads that carry what I say is an improper spelling of "gray." I don't know whether it is within the prerogative of the publication to tell its advertisers how to spell a word or not, but it would seem to me that it would be a good thought to suggest to them what "I" consider proper spelling. Maybe you do, too, and if so then you would probably use the approach I suggest, but otherwise you might figure that Pete Rentschler doesn't know how to spell "gray" anyway.

PETER E. RENTSCHLER
President
Hamilton Foundry & Machine Co.
Hamilton, O.

* * *

Ain't No Such Animal

TO THE EDITORS:

Can you give me the name and address of any iron foundry in this country which makes cast iron figures of deer or other animals? On my lawn I have a beautiful casting of a stag, a product of the Woods Foundry, Philadelphia, about 1865. An admiring friend would like to get a similar ornament for his lawn.

M. A. GARVEY
President
The Trumbull Bronze Co.
Warren, O.

Editor's Note: So far as we know there is no foundry in this country engaged in the production of cast iron animal statuary. The Philadelphia Ornamental Iron Works, founded and conducted for many years by R. A. Wood, employed 300 men in 1874. This company and several others in the same general line of endeavor folded in the eighties and nineties of the last century.

Several years ago in response to an inquiry from a western FOUNDRY reader who wanted a cast iron figure of a lion, we wrote to several firms, successors in whole or in part to former statuary makers. In every instance we were assured that that phase of foundry activity had disappeared. As a possible item of interest the B & B Metal Crafters, Blanchester, O., make cast iron lawn and garden furniture, including the fairly familiar figure of the smiling Negro boy with a ring in one uplifted hand for hitching a horse.

The October, 1946 issue of FOUNDRY contained an exceptionally entertaining and historically accurate article by John Morrison on the subject of metal statues—animal and human—under the title "Where Are The Dogs of Yesteryear?"

* * *

A Booster for Turkey

TO THE EDITORS:

Since my arrival in Turkey, I have often thought of sending you a letter or article dealing with Turkish foundry practice, both old and new, which might interest your many readers. But as my first five weeks disappeared and my efforts met mainly with a series of frustrating disappointments, I decided that I had nothing to say worthy of appearance in your very dignified periodical.

I came to Turkey to serve in government foundries as a foundry sand

(Continued on page 80)

There's an "R" in TIMKEN®

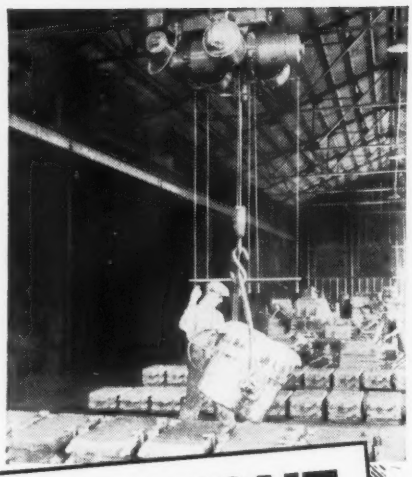
HAVE you ever noticed we often spell "TIMKEN"® with an "R"? It's just to the right, near the top of the "N", and it means that "TIMKEN" is the registered trade-mark of The Timken Roller Bearing Company. It's your assurance of getting the highest quality tapered roller bearings, fine alloy steel bars, seamless steel tubing or removable rock bits.

But remember, "TIMKEN" *is* a trade-mark, not a type of product, and you'll find it only on products made by the Timken Company.

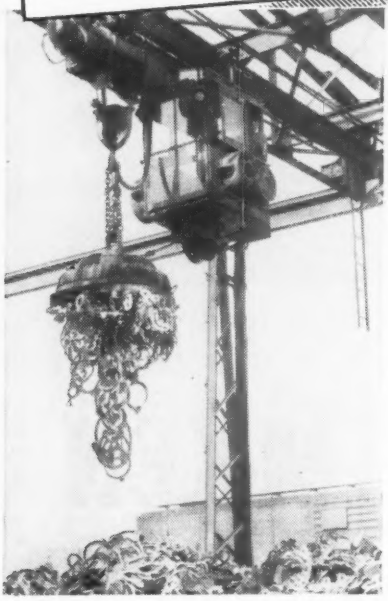
Industry has made it a habit to look for the trade-mark "TIMKEN" when buying tapered roller bearings, alloy steel bars or rock bits. Why not make "TIMKEN" your "buy word" too? There's over 50 years of experience behind it. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

SHEPARD NILES
Floor-Operated Hoist

Operator mainly occupied with other duties. Hoist used for fast, efficient handling of relatively short hauls.



WHICH HOIST is RIGHT FOR YOUR JOB?



SHEPARD NILES
Cab-Operated Hoist

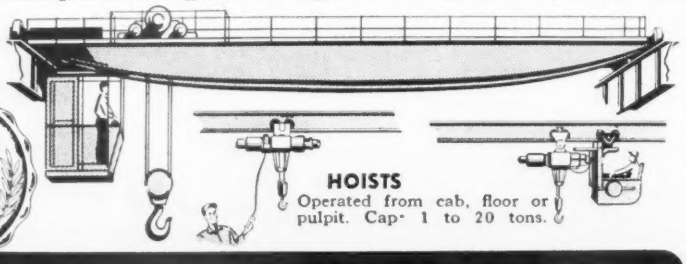
Operator in cab moves loads along at high speeds—occupies best vantage point for spotting or stacking materials.

Choosing the hoist that's right for your job calls for expert advice.

Let the Shepard Niles representative in your area guide you in your choice. He specializes in through-the-air handling—can help you select the hoist that best fits your job. Write Shepard Niles today for latest bulletins describing both types of hoists—and ask to have a representative stop by your office.

CRANES

Overhead: Top running, inner running, under running, floor or cab operated. Cap: 1 to 450 tons.



50th ANNIVERSARY
SHEPARD NILES CRANE & HOIST CORP.
1903-1953

HOISTS

Operated from cab, floor or pulpit. Cap: 1 to 20 tons.

SHEPARD NILES
CRANE AND HOIST CORPORATION

1324 Schuyler Ave., Montour Falls, N. Y.

(*Continued from page* 78)

consultant, with the end in view of improving and increasing production of arms, small parts for agricultural machinery, etc. Arriving here, I first found a grade of Istanbul sand generally in use which is of very poor quality and exorbitant in price. We have no core oil, no pitch, no good fire clay or fire brick, no bentonite, corn flour or decent seacoal—practically no nothin'! My first job became not a matter of "consulting" but rather of discovering. Endured five weeks of frustration before the tide turned. Now at last favorable reports are coming in. My prospectors in the field are reporting "finds" of clay and sand that sound encouraging. Some have even brought in samples that might serve our present purpose. Nearly all of them are better than the stuff we now buy.

The various government agencies, railroad, geology, roads, Army engineers, etc., have their sleeves rolled up, and it looks as though we will get some desirable action!

My friends in America are offering me their whole-hearted support in the matter of complying with requests for needed information. Among them, I am especially indebted to Clyde Sanders of American Colloid Co. and John Bermingham of E. F. Houghton & Co., now stationed in San Francisco. Both of these boys have placed their patriotism above the profit motive, and have given me information that is at this moment and for this cause, beyond price. It's a weak word, but I am "grateful," and I am sure that Turkey will be!

I have just received news that bentonite has been found in the northern part of Turkey at a place called Zonguldac. As quantity and quality have not been reported, I shall get up there as soon as I can conveniently do so. Have thus far worked in two foundries at Ankara, and this cannon factory at Kirikkale. I believe that I am slated for two others before my return to America, which should be about Feb. 1. Have been busier than the proverbial one-armed paper hanger, and still have reports to make, which if completed on schedule, will leave me little time for anything else. From the present outlook, I'll get home just in time to miss the California regional.

I have neither the time nor mental calm necessary to write anything that you could accept for publication, nor may I ever have. But should you feel that some of my impressions could later be used, I might, at your invitation, endeavor to set them down, not for a moment pretending to be an authority, but merely as one who

(*Concluded on page* 82)

Furnace linings last longer

when they are made of Norton-engineered Special Refractories

Fewer shut-downs and more continuous operation is always the story when linings are made of Special Refractories engineered to your job by Norton. Whether you are melting ferrous or nonferrous metals there are Norton mixtures for a wide variety of successful applications that mean more metal melted per lining, fewer furnace shut-downs and generally lower costs.

There are so many complications in metal melting, involving chemical, electrical and physical conditions it will pay you to take advantage of Norton's 40 years' experience in solving Special Refractory problems like yours.

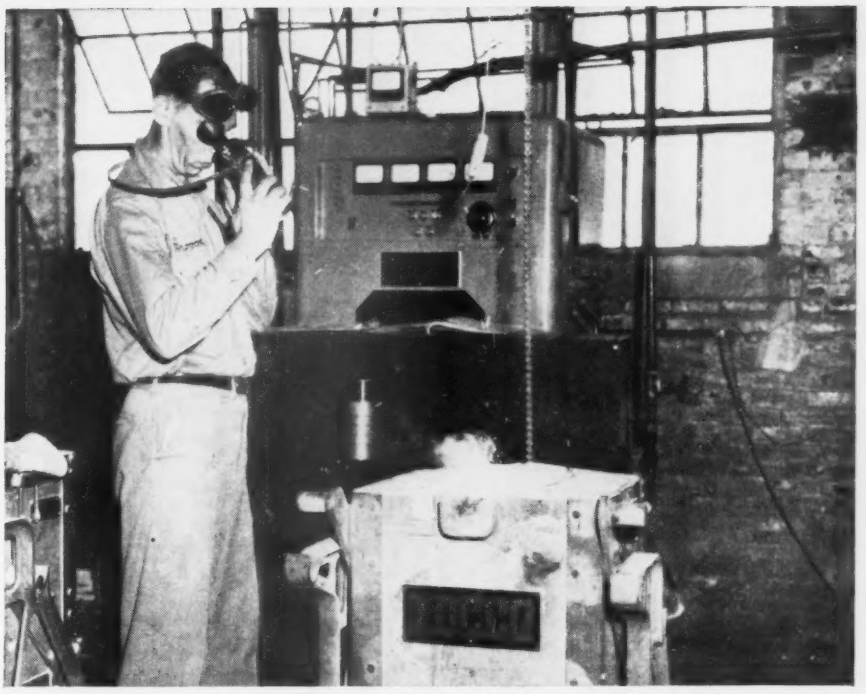
Many different materials

Norton furnishes Special Refractory grain, cements and bonded shapes in a wide variety of mixtures each engineered for a particular set of conditions.

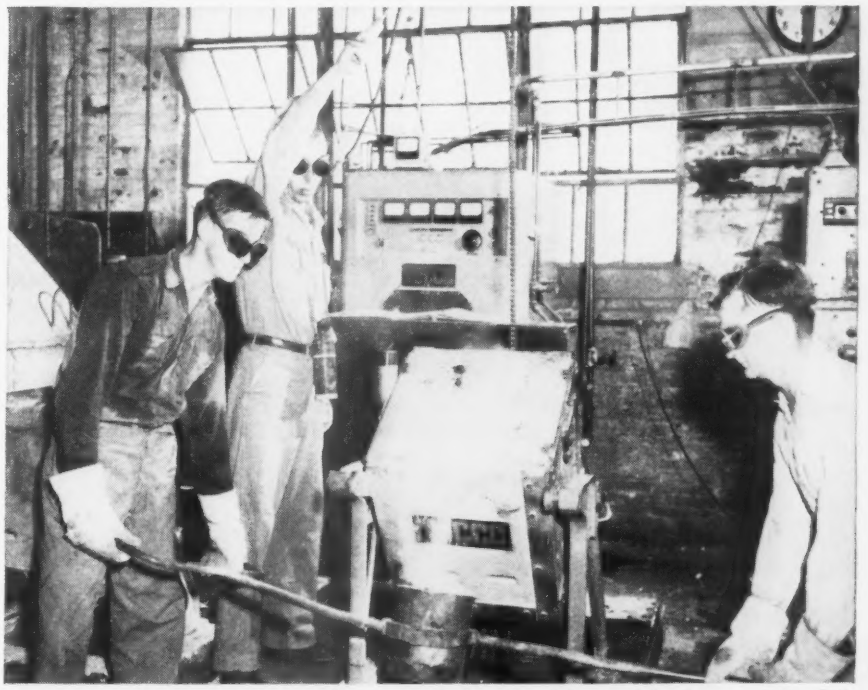
Such special Refractory Materials as CRYSTOLON* (silicon carbide), ALUNDUM*, FUSED STABILIZED ZIRCONIA.

What is your problem?

We believe you will benefit by consulting your nearby NORTON Representative or writing Norton Company, 301 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.



Taking the Temperature reading on the melt at the Metalmold Corporation plant at Groton, Mass. Temperatures go 3200° F. and higher. MAGNORITE* grain placed between the crucible and the coil has such high rammed density that it offers great resistance to penetration, erosion and chemical attack.



Longer Life for Furnace Linings can be expected when the right special refractory is used. In this plant they count on MAGNORITE to prevent short circuits in the event of crucible breakage. MAGNORITE keeps metal from reaching the primary coil of the furnace.

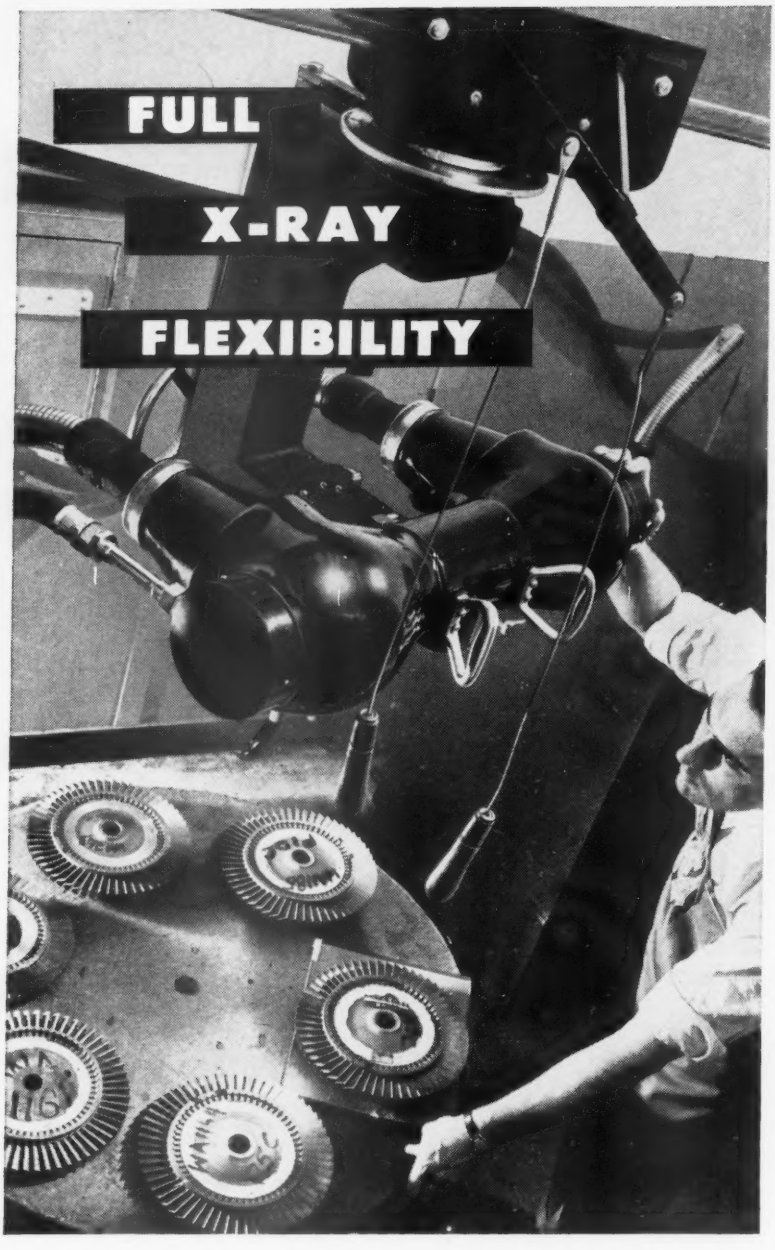
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON

Special REFRACTORIES

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS



WESTINGHOUSE 250 KV JIB CRANE X-RAY UNIT

Curtiss-Wright uses Westinghouse X-ray equipment for nondestructive testing of vital parts of their outstanding aircraft engines. Here, they're examining critical welds on gas turbine booster rotors. Prime reason for selection of Westinghouse equipment was *flexibility*—since *flexibility* results in more radiographs per shift.

Kilovoltage on this unit varies from 30 to 250, with greater X-ray output per KV because of constant potential high voltage generator. Result: unit is capable of inspecting materials ranging from 1/8" aluminum to 4" steel.

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YOU CAN BE SURE...IF IT'S

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(*Concluded from page* 80)

has worked closely with the Turks for a brief three-month period, and who now entertains a very high regard for these wonderful guys, who are so little understood by Americans.

If the war we fear should come, Turkey will be our first line of defense; and we want to make it a strong line. This is only one man's opinion, but I believe that at present Turkey is America's one best bet in either Europe or Asia. Though a very poor nation, 80 per cent agricultural, her new democracy patterned after our own is only 25 years old. Progress she has made is quite incredible. Her's will be a people to watch in the coming years. This experience may prove a physical and financial loss to me, but it already has proved the most inspiring and challenging opportunity I have ever known. The Turk is OK in my book, and his courage and outlook are admirable. He has taught me a lesson in human decency that I shall not soon forget!

HAROLD E. HENDERSON

Editor's Note: Mr. Henderson, temporarily serving with the U. S. Mutual Security Agency in Turkey, for a number of years has been associated with the H. C. Macaulay Foundry Co., Berkeley, Calif.

* * *

Likes the Christmas Touch

TO THE EDITORS:

I write to congratulate you on the format of your December issue, especially the cover. After all, Christmas is a happy time and happiness comes to a very large extent from work as your cover indicates.

I have dropped a line to the president of the Hines Flask Co. congratulating him on their advertisement in the same issue. No matter how long it may take, the application of the Golden Rule will have to be the basis of peace and freedom.

HAROLD J. ROAST
Bronze Foundry Consultant
53 *Finchley Road*
Hampstead, Que., Canada

* * * *

Thanks From a Student

TO THE EDITORS:

I would like to express my thanks and appreciation for your 12 issues of FOUNDRY. I have seen your splendid publication around the school campus, but previously have had little opportunity to read and appreciate it.

After reading your publication I am more thoroughly convinced that the foundry offers great opportunities for young engineers.

ERNEST L. SWENSON
Missouri School of Mines
Rolla, Mo.

DoALL FRICTION SAWING

SAVES 15½ MAN-HOURS PER DAY REMOVING GATES AND RISERS

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In DoALL friction sawing, friction created by high saw band speeds (up to 15,000 ft. per minute) heats the metal to its forging temperature. The softened metal is hogged out at remarkably high speed. Ask to see a free demonstration in your foundry. Call your local DoALL Sales-Service Store or write.

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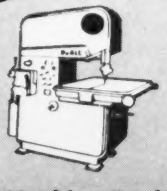

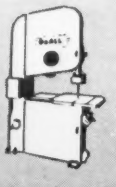

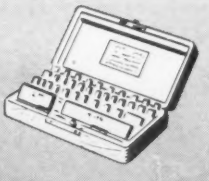

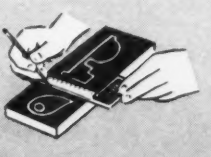

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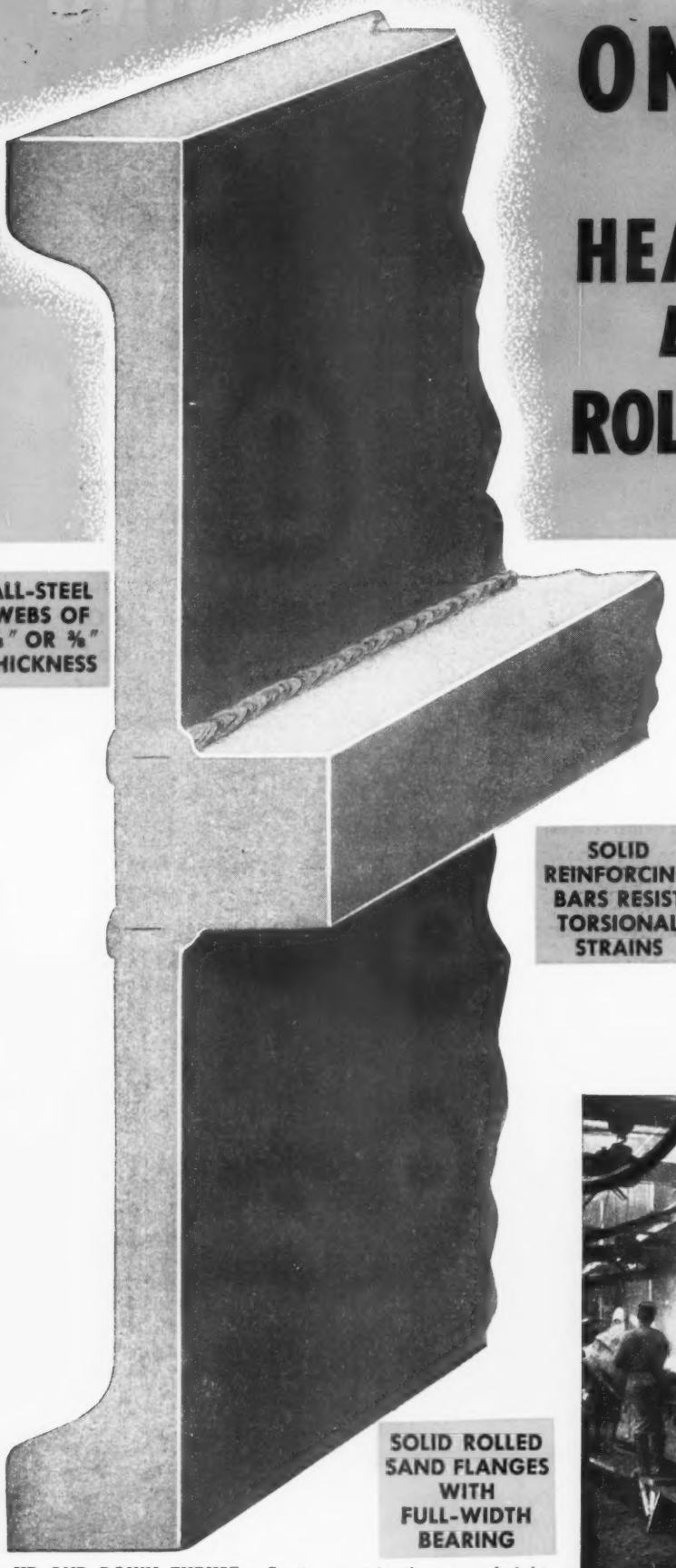
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Why Not Make It Permanent?

Frequently during World War II foundrymen found it most difficult to give maximum service to the nation. This came about because control and procurement agencies of government were not familiar with the importance of castings in any war effort.

As a result of this experience, trade associations serving the foundry and allied industries joined forces through the National Castings Council to give Washington agencies a better understanding of the basic character of castings in our economy. This co-operative effort in 1948 caused the Munitions Board to organize 12 foundry advisory committees, with industry representatives serving as chairmen.

Back in 1949 and 1950, the foundry industry boasted of the most comprehensive advisory committee setup in the Munitions Board. Considerable progress was being made until the Department of Justice, with small regard for the welfare of defense production, ruled that only government employees could head industry committees. From that time, usefulness of these committees declined rapidly, and they since have been disbanded.

While consultation with advisory committees was authorized in the Defense Act of 1950, the National Production Authority took better than a year to complete advisory committees for all branches of the foundry industry. These have been consulted and undoubtedly were of considerable service in furthering production during the emergency period.

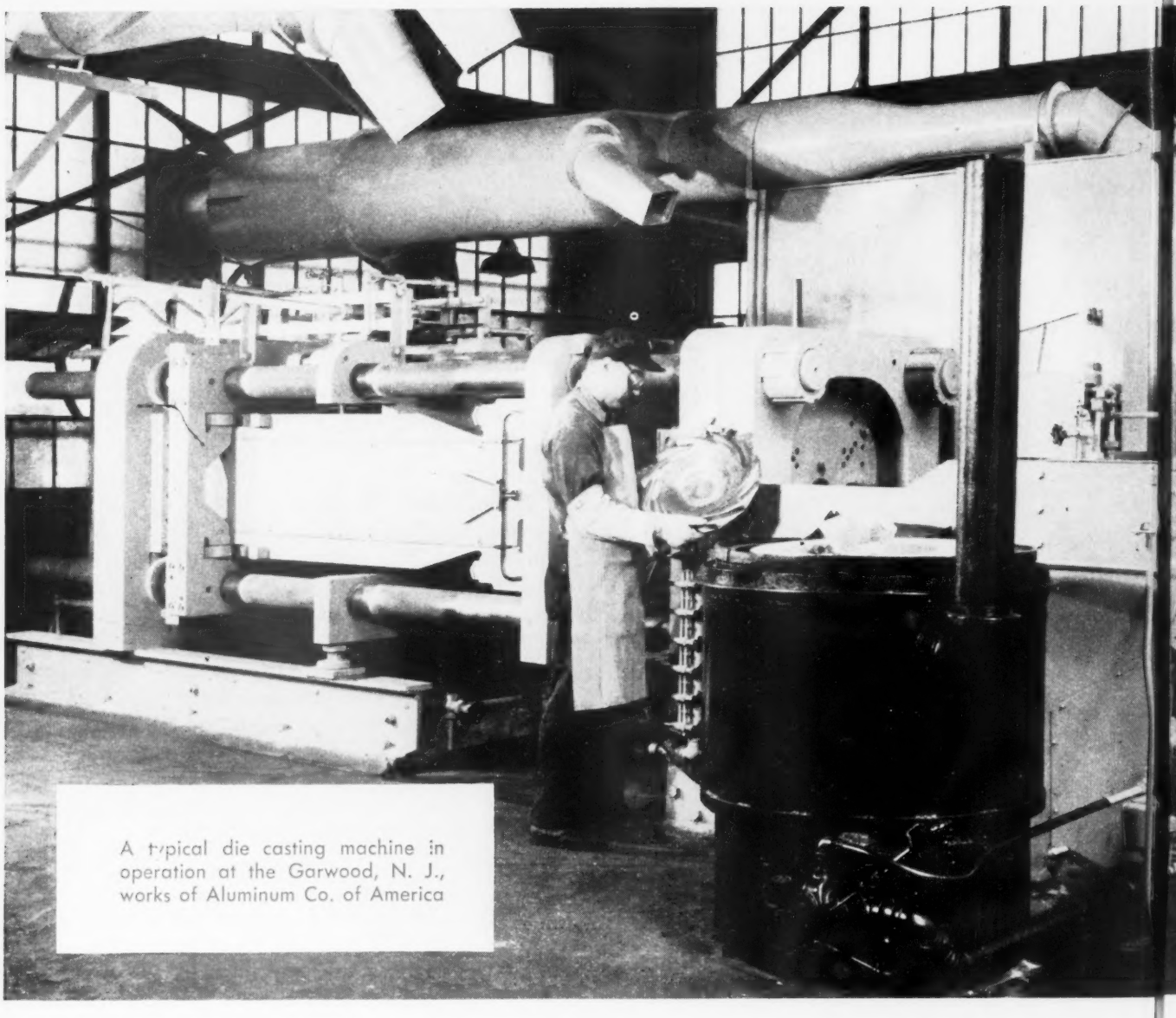
Essentiality of castings in emergency production programs demands some type of permanent organization which will permit leaders of industry and government to co-operate in developing practical solutions to critical problems of controls, procurement and production. Such permanent committees will make it possible for industry to assist in setting up emergency organizations, such as the NPA, rather than being faced with the necessity of trying to function with a structure built without adequate knowledge of industry's requirements.

To accomplish this, the Congress should authorize the early establishment of permanent industry advisory committees to the Secretary of Commerce from those industries essential in any emergency production program. Use of industry members as chairmen should be spelled out definitely by the Congress. Furthermore, a liaison should be authorized so that these committees also can co-operate with all other branches of government.

Permanent committees, wisely organized and skillfully handled, will permit government to understand the potentials and problems of an essential industry before trouble develops. They should go far in speeding emergency production.

Frank G. Steinbach

Editor



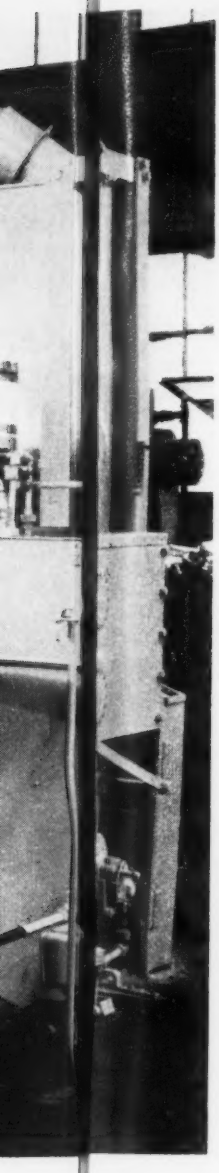
A typical die casting machine in operation at the Garwood, N. J., works of Aluminum Co. of America

Trouble-Shooting

DIE CASTING PROBLEMS

Some of the more common defects encountered in the production of die castings, together with their probable causes and methods of correcting the difficulties, are discussed in this first of two articles

By W. M. HALLIDAY



CONSTANT developments have been taking place in die casting techniques, especially in respect to improved operating procedures, superior die designs, better materials and more serviceable alloys. At the same time, greater understanding has been gained of die casting problems and of the causes of the various types of defects which occur in pressure die castings.

The problems connected with modern precision pressure die casting are always extremely interesting because of the different nature of each component and its die design and the generally unusual or difficult features requiring reproduction.

These troubles may occur for any reason, or even for no discernible reason. One major cause is lack of control over die casting procedures and the many variable operating factors involved. Similarly, deteriorated, contaminated or overheated alloy may give rise to a whole host of problems.

On the other hand, many troubles owe their origins to some deficiency in the die, which may fail to function in the anticipated manner or be incapable of producing parts in accordance with the customer's stipulations concerning quality, accuracy or serviceability.

These and other irregularities may create defects of such a magnitude as to render castings unfit for their required service. Fortunately, the number of defects likely to lead to a casting's being scrapped is small, but the specific operating conditions, die limitations and other undesirable factors contributing to such flaws are numerous and varied.

This circumstance is one of the chief reasons why it is generally no easy matter to isolate, identify and correct the cause of any particular fault. Several factors may, of course, operate simultaneously to produce an irregularity. That situation renders investigation and application of corrective measures still more difficult.

Die Casting Technique—As a preliminary to the description of common die casting faults and the analysis of their chief underlying causes, a brief outline of pressure die casting technique will help to indicate the chief sources of casting irregularities.

Precision pressure die castings are produced by the forcible injection of a molten alloy charge into inflexible, permanent, precision type steel dies. These have accurately formed cavity impressions reproduced in negative form to correspond with the shape of casting desired. Dies are worked at relatively low temperatures so that solidification starts when the molten alloy charge enters the matrix area and is completed within a comparatively few seconds.

Solidification is accompanied by commensurate shrinkage in the volume of the casting, for which allowances have to be made on all critical dimensions of the cavity impression and on all cores interjecting therein.

The solidified casting, still very hot, is ejected, usually by some partially or fully automatic, mechanical means. To facilitate such ejection and to simplify die manufacture, the latter tools are made in split form, comprising at least two main members which in working position have to seal closely on the parting joint to avoid leakage of molten alloy and formation of fins on castings.

Dies are mounted on a pressure die casting machine carrying a supply of molten alloy, at the correct temperature, sufficient to produce a large number of castings. (This applies only to hot-chamber machines commonly in use with the lower-melting-point alloys.) The die casting machine has a high pressure injection mechanism, charges of molten alloy being pumped in rapid succession into the closed dies.

To form holes and openings in the walls of the casting, cores have to be employed. These may be of solid, split, or collapsible types, according to component design. Draft or ejection taper must be provided on the sides of these elements to ease extraction from the casting. Some ejection draft is desirable on all cavity walls, especially with deep formations.

During solidification the casting shrinks *away* from the walls of the matrix, according to its size, thickness of wall section, the natural shrinkage rate of the alloy and the extent of coring. It contracts *onto* fixed or movable cores in like manner, often with terrific gripping pressure—hence the need for ejection taper.

Unless ejection draft is provided on such members unduly, high ejection force may be required to strip the casting from the cores. This force in turn may induce considerable distortion, bending or even cracking of slender wall portions and puzzling variations in finished dimensions.

It is important to exclude air, gas or lubricant vapors from the critical die cavity before the molten alloy charge is injected. If this step is not taken, gas or air may become occluded in the incoming charge and cause voids, porosity or other flaws in the finished casting.

Metal temperature and die heat have to be controlled carefully to obtain satisfactory working results and freedom from irregularities. Dies must be equipped with a feed system comprised of sprue, runners and gates to lead the alloy charge most effectively from machine nozzle to die matrix. The capacity, shape, direction and general layout of such a runner/gate system is of paramount importance, especially when castings require complex configuration or highly precise features.

The pressure and velocity of the incoming alloy charge, the speed of ejection of finished castings, the operation of movable cores and the water-cooling provisions applied to the die also have to be determined carefully according to type of alloy, size and

shape of casting and the manner of die feeding.

Dies must be maintained in sound condition because of inimical chemical and abrasive action of the molten alloys. This care is important for the maintenance of precision accuracy in casting dimensions. The onset of wear in some die members may completely upset the original accuracy of the die.

High-Grade Die Castings—This brief outline of die casting technique shows that four essential factors demand careful operation and control. These are 1) the die; 2) the alloy; 3) the machine and 4) the general working conditions, covering temperatures, pressure, velocity, coring, ejection and other points. Shape, accuracy, quality of external finish and exact uniformity of castings are largely determined by the quality of the die. Soundness, strength and other physical features are controlled partially by the inherent properties of the alloy used, the construction of the die and the nature of operating conditions.

A wholly satisfactory high-grade pressure die casting possesses at least five characteristics:

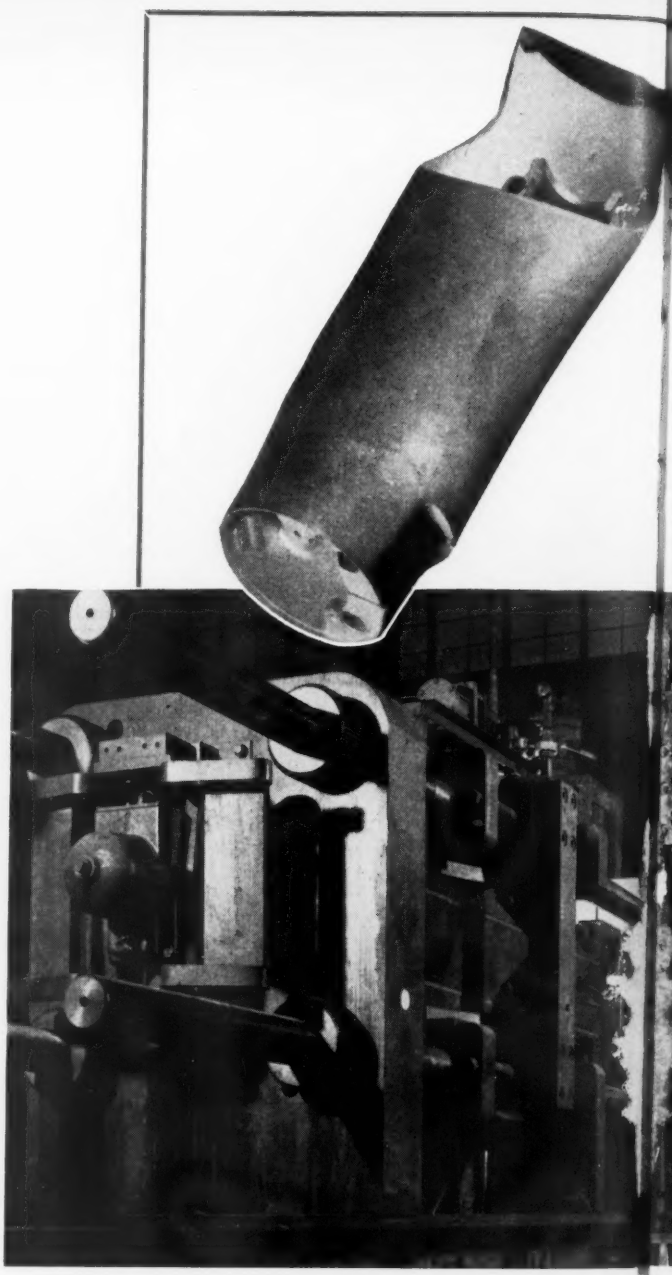
1. Close precision on critical dimensions.
2. Accurate shape and form.
3. Excellent surface finish and appearance.
4. Adequate mechanical strength and stability.
5. Structural soundness and fine homogeneity of walls.

A precision casting holds the important dimensions —but not all dimensions—to tolerances of plus or minus 0.001-in. per inch of dimension. Such close accuracy depends too upon other die design considerations; appropriate disposition of controlled portions of the casting to the main parting joint of the die; the character of the runner/gate feed; the intervention of cores and the uniformity of size and general thickness of wall sections.

The manner of ejection and the general coring layout also influence accuracy. These features may drastically control the rate and evenness of shrinkage and the speed of ejection. Apart from these possible causes of variations in the accuracy of castings, the size of cavity formation and the correctness of shrinkage allowances affect accuracy in finished parts.

The surface finish of a good quality die casting is extremely smooth, uniform and clean-cut, with all finely relieved details and impressions sharply defined. To a large extent, the quality of finish on cavity walls determines that on the finished castings. On the other hand, die and alloy temperature, injection pressure and velocity of alloy charge as it enters the die matrix are likely to affect finish of castings.

Quality die castings also have sufficient mechanical strength and rigidity to withstand service stressing. It is worth-while to note that strength is not always wholly dependent upon the basic physical qualities of the die casting alloy. It will be conditioned greatly by general design of component, especially by the use made of conventional strengthening provisions in the form of beadings, bosses, fillets, ribs and flutings. These often may be introduced advantageously to increase strength and stiffness of casting walls without any appreciable increase in base wall thickness or in the total amount of metal in the casting. Often, weight reductions can be achieved by judicious application of such features.

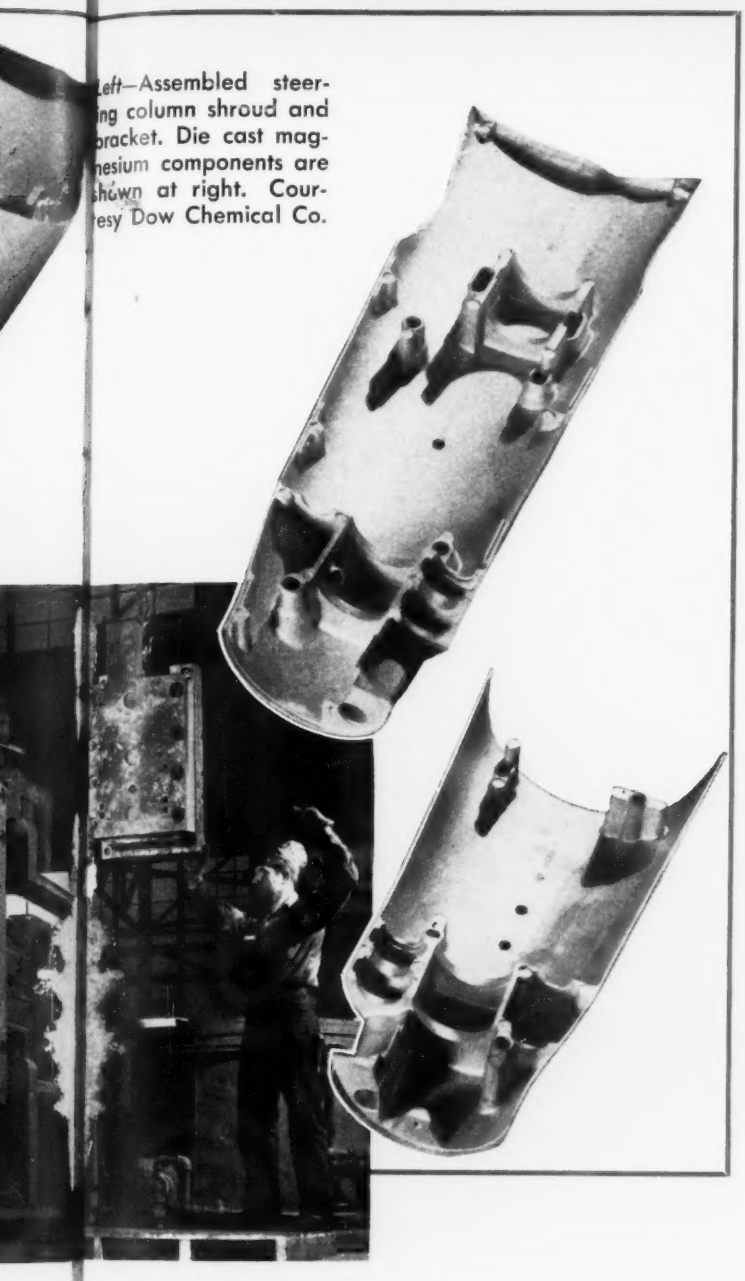


A crane sets a large die on a die casting machine. Courtesy Aluminum Co. of America

Die castings also must have extremely close-grained inner microstructure, yielding a degree of homogeneity of at least 92-95 per cent of total possible solidity.

The inner core layers of the die cast wall should be strong and tough, but less finely grained than the characteristically hard, durable, outer skin layers.

The depth of these outer layers ranges from 0.015 to 0.025-in. in a high-grade casting, regardless of total wall thickness. This is the reason why a relatively thin-walled casting is proportionately stronger than a thick-walled section, for the ratio between the hard outer layers and total thickness is higher in thin-walled castings.



Left—Assembled steering column shroud and bracket. Die cast magnesium components are shown at right. Courtesy Dow Chemical Co.

Homogeneity of wall structure is considerably influenced by the following factors: Temperature and velocity of injected charge; injection pressure; die heat and its thermal stability; direction of flow of the injection charge; location of cores and ejectors; character of runner/gate feed, particularly the location of the gate entry in cavity; and the kind of alloy.

The practical effects produced by some of these factors and by working conditions will be explained more clearly when we deal with specific irregularities and their probable causes and remedies.

Common Defects—Some of the more common defects, errors and undesirable features encountered in die casting foundries are these:

1. Dimension and shape inaccuracies.
2. Distortion, warpage and cracking due to unequalized shrinkage pressures.
3. Incomplete fill of cavity and partially formed or excessively hollow (shell) castings.
4. Porosity due to trapped air, gas formation, unequalized shrinkage and incorrect gating.
5. Cold shuts.
6. Hot shortages.
7. Flow marks, flowers, bubbles, pimpling and surface-sinks due to poor gating, nonuniform shrinkage, excessive turbulence and poor flow direction.
8. Foam and spongy patches.
9. Inclusions of foreign substances, chiefly due to alloy oxides, iron oxides from die and residual scale from burnt die lubricants or dressings.
10. Heterogeneous internal structure of cast walls due to porosity, seams and segregations.

Some of these irregularities occur only in conjunction with certain alloys, whereas others develop with any kind of alloy and are primarily due to some inadequacy in the dies or the working conditions.

As a general rule, these faults are more likely in the high-melting-point alloys such as magnesium, aluminum, aluminum-bronze, copper-base and the brasses. Use of these alloys nearly always imposes far more severe service stressing of dies than use of those in the low or medium melting point ranges.

Considerations will now be devoted to the causes, effects and cure of these listed irregularities. To offer greatest practical guidance to die casting engineers, they will be treated in the following manner. First, the observable symptoms associated with each particular fault will be described; then the possible causes will be listed, followed by the treatment required to eliminate or reduce such faults.

Conditions Affecting Accuracy—The importance of close precision in the sizing of cavity formation has already been mentioned briefly, but it is not the only factor likely to affect attainable accuracy. Moreover, it will not always be easy to fix essential cavity dimensions at the initial stage of die manufacture. Certain allowances have to be made in these dimensions to compensate for shrinkage during solidification.

This latter is nearly always a variable factor with any alloy group. It usually is not determinable within precision limits unless proving tests are made on the new die to obtain a sufficient number of representative castings which may be checked and measured in order to assess the magnitude, direction and actual effects of such shrinkage.

Therefore, correct shrinkage allowances are of prime importance, and die designers usually have to resort to empirical values, the scale of which varies according to the type of alloy used.

For example, with zinc-base alloys this empirical compensatory value is 0.005-in. per inch of dimension; with tin-base alloys it is 0.003-in. per inch; with aluminum alloys it is 0.007-in. per inch, and with magnesium 0.008-in. per inch.

How such empirical values are obtained can be understood by a consideration of zinc base alloys. These alloys have a lineal expansion of 0.00002-in. per inch of dimension for every degree Fahrenheit of temperature rise. Thus if such a die casting is ejected from the die at say 400°F, it may undergo a total

linear shrinkage of approximately 0.008-in. per inch. Incidentally, most die castings are prevented from contracting uniformly in all directions by the intervention of cores or by varying wall thickness. The latter is one of the chief contributory causes to dimensional variation.

An allowance of 0.008-in. per inch would, however, be excessive, because the die is heated also and cavity dimensions expand.

The standard rate or linear expansion of steel is 0.000007-in. per inch per degree (Fahrenheit) of temperature increase. Therefore at 400°F, cavity sizes will expand 0.0028-in. per inch.

When cavity formations are machined, therefore, the true allowance to compensate for casting shrinkage and die expansion will be the difference between the two values mentioned—that is, 0.0052-in. per inch. Hence we derive the empirical rule.

These values apply only in average cases where the casting is perfectly free to shrink in all directions. The rule also assumes that die heat will be approximately the same as that of the casting at the instant of ejection.

In actual practice there may be wide divergence from such assumed ideal conditions, and cavity sizes generally are made slightly smaller than the estimated compensated values given by such empirical rule. Cores will be made correspondingly larger, to provide reasonable margins for later enlargement of cavity sizes or reduction of core diameters in the most economical fashion, as revealed to be necessary by measurement of actual test castings.

Shrinkage of castings and resultant accuracy also depends upon a number of other factors. Chiefly, these include the temperature of the alloy at injection; die heat; speed of core withdrawal and ejection and the length of time the casting remains on cores after injection; distribution of die metal masses relative to cavity and runner feed system and its heat-radiating features; the presence of cores, bosses, or similar shrinkage-arresting agents in die construction, and the degree of ejection draft employed on critical die elements.

Die castings thus may exhibit considerable dimensional variation, according to quality of control and fluctuation of the above factors. With high-melting-point alloys and castings of complex configuration, the effects resulting from some or all of these factors may render it difficult to attain or maintain fine tolerances.

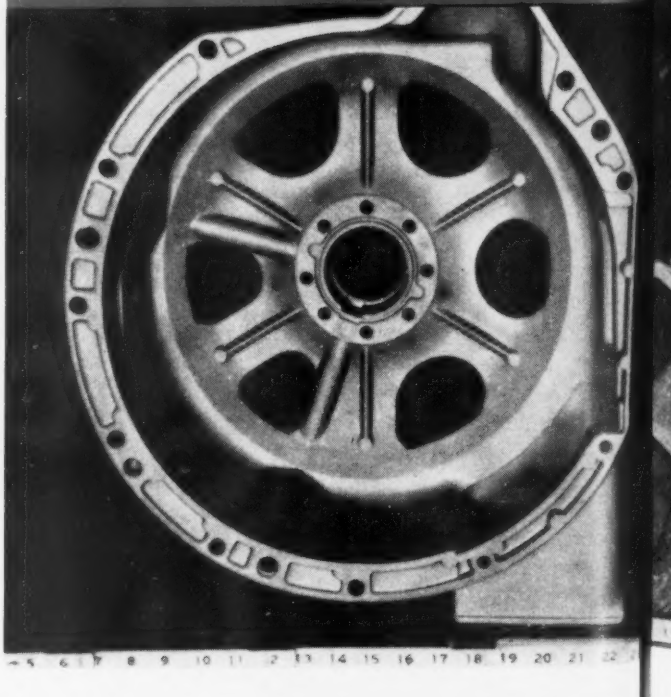
In the light of these considerations capable of influencing casting accuracy, this range of symptoms may be encountered:

Symptom—If such factors as die heat, alloy temperature, ejection speed, core withdrawal, etc., have been stabilized and no *single test casting* meets the required tolerances on critical dimensions, the cause and its remedy generally are as follows:

Causes—1. Most probable cause is incorrect sizing of cavity and/or core dimensions. This may occur by reason of errors during die manufacture, incorrect shrinkage allowances or unequalized shrinkage in the casting.

2. Excessive alloy temperature and wrong die

Ladling molten aluminum into the injection cylinder of a cold chamber die casting machine at the Chicago works of Aluminum Co. of America



heat may also be a contributory cause since such working features vitally influence the rate and extent of shrinkage in a casting.

Remedies—Cavity and core dimensions should be carefully checked, at working temperature of die. Accuracy of shrinkage allowances on these portions should be tested to cover the *actual measured* shrinkage with castings. In determining the latter, measure at least 10 to 15 randomly selected castings cooled normally to room temperature.

If external dimensions, as reproduced by cavity form, are undersize or cored holes are too large, correction is comparatively simple. With discrepancies in reverse order, however, correction may be more serious and costly, for they require new (larger) cores and drastic machining modifications to the cavity.

In the case of further causes as listed at 2., the remedies are self-evident. Adjustments will be required in the alloy and die heating, which should be scaled down gradually during an actual test run until correct optimum temperatures are reached consistent with accurately sized, uniform castings. The appropriate die heat for each particular type of casting will be influenced by design shape, wall thickness, uniformity of wall sections and similar factors. The best temperature therefore will have to be determined by practical experiment.

Symptom—Ability to produce some castings to stipulate close tolerances on critical dimensions, but tendency to wide variations in these dimensions in other castings produced in the same run.

Causes—1. Excessive heat variations in die.

2. Too high or unduly varying alloy temperature.

3. Too long delay between injection and ejection of part.

4. Unequalized shrinkage.

5. Distortion.

Remedies—1. Untoward heat variations in the die may arise for several reasons: Unsatisfactory layout of runner channels, poor water-cooling provisions, incorrect location of gate, over-rapid heat radiation from the die due to exceedingly thin walls surrounding the die cavity, etc.

Die temperature should be carefully checked over a specified production run with a pad of heat-sensitive, cobalt-impregnated paper. This pad, formed by two sheets of ordinary brown paper clipped or gummed to an interposed sheet of heat-sensitized paper, should be cut slightly larger than the dimensions of the die parting joint. The die is opened for insertion of this composite pad, then lightly closed upon it. The paper remains therein for 5 or 10 seconds, whereupon it is removed. The hottest portions of the die are indicated by a number of blue patches on the sensitized paper. These should be scored around with pencil marks and labeled as first check.

After a given period of normal casting production, say 15 minutes, a second test is made with the sensitized pad, which is inserted for the same period as before. The results are penciled again and marked as second check.

Usually three of four successive tests of this kind suffice to show the heat increasing and distribution tendencies occurring in the die. The practical value of such a graphic check is to afford reliable guidance as to the best location of water-cooling channels and a check on the operation of those installed.

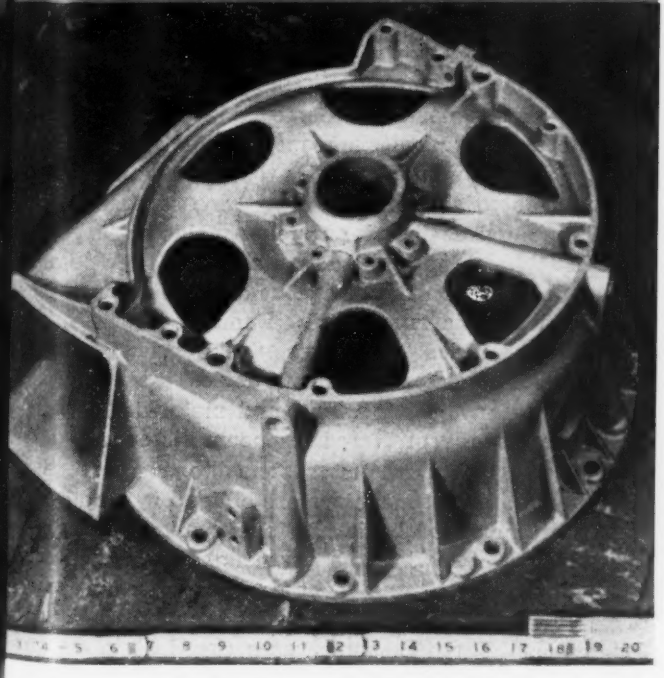
An improved thermal balance in the die also may be promoted by judicious layout of the runner system. This layout very often can be adapted not only to feed molten alloy effectively to the die cavity, but to direct the flow of molten alloy over portions of the die that tend to lose heat too quickly by radiation. In the case of castings with large surface area but thin wall sections, gated only at one side, the provision of *dummy* runner channels at the opposite side, without gate termination of course, often serves to equalize and stabilize die heat at the proper level. By this means a supply of hot alloy is made to flow evenly around the cavity formation, instead of only along one side. Thus radiation is more nearly uniform.

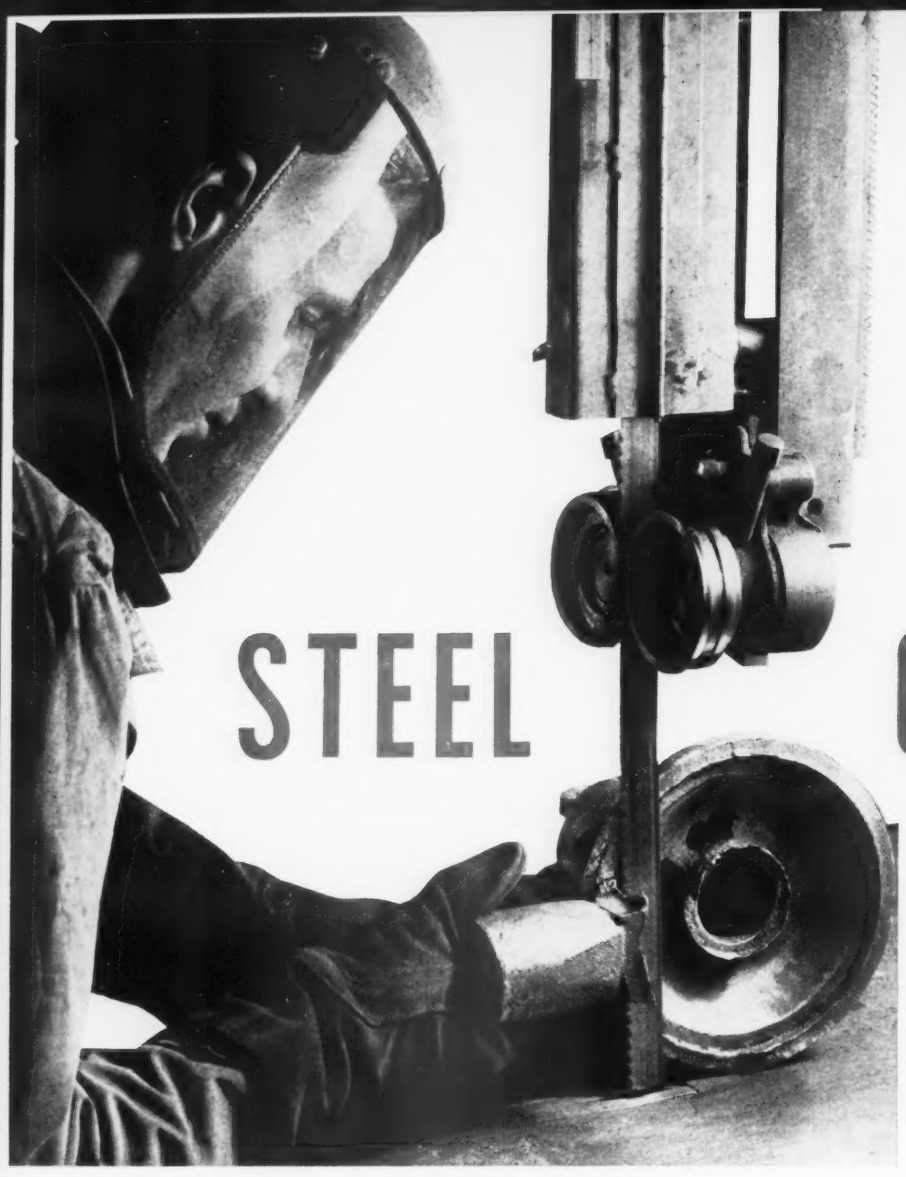
Attention also should be given to the feasibility of water-cooling large cores producing deep holes or extensive side openings in walls of casting, so that quicker dissipation of heat may be obtained.

Undesirable fluctuations in die heat often may occur because of grossly irregular operation of the die. If the die is operated at four shots per minute continuously for 10 minutes and then is allowed to rest for 10 minutes, unequalized heating is bound to occur, leading sooner or later to difficulties in controlling casting dimensions and to other troubles. A much better method is to determine the easily achievable *regular speed* of operation and adhere to it.

Reasons for interruption of operation of the die can be numerous and varied. Difficulties with extraction of movable cores, unsatisfactory ejection due to faulty or inadequate (*Please turn to page* 262)

Automotive torque converter die cast of magnesium. It weighs 10 pounds; longest dimension 18 inches. Photo courtesy Dow Chemical Co., Midland, Mich.





Shaking Out ... Cleaning ... Welding ... STEEL CASTINGS

This is the first in another series of articles discussing steel foundry practice. The present series will describe methods and equipment employed in preparing the solidified casting for shipment

By JOHN HOWE HALL
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Fig. 1—Friction bandsaws often are employed to cut gates and risers from steel castings rapidly and economically

AFTER steel castings have been poured, they must remain in the sand until they are cool enough to be handled without risk of distorting or tearing. The time required naturally varies with the size of the pieces and particularly with the thickness of their various parts. Small work can be shaken out of the molds in a matter of minutes or at most an hour or two after pouring, whereas heavy castings have to be left in the sand for several days. In exceptional cases, it may be as much as a week or ten days before they can be handled safely.

Light green sand castings made in snap flasks or small cope and drag flasks were formerly shaken out by hand and the sand left in windrows which were cut over with shovels for the next day's work. Today, however, sand cleaning or reclamation is almost universal in the industry, and in all but very small shops, the molds are sent over roller conveyors or carried by the crane to mechanical shakeout devices, such as that shown in Fig. 2. The castings, flasks and bottom boards are delivered at one end or side of the machine, and the sand falls through a grating onto a belt or other conveyor which carries it to screens and thence to bins at the sand mixing plant.

Larger flasks usually are moved by the overhead crane to a mechanical shakeout on which they often must be partially supported by the crane as the sand is jarred out of them. There are also several styles of air-operated devices for rapping molds as large as 20 x 24 ft which have the advantage that they do not deliver the blow on the flask, but on a holding device from which it is suspended. Damage to the flask thereby is avoided. However, flasks properly supported on mechanical shakeout devices need not be damaged to any great extent, and motor-driven machines are usually preferred to pneumatic ones.

In many states, exhaust systems to carry off the dust from shakeout machines are obligatory, and even when not compelled by law to use them, no management today would wish to operate a shake-out without one. The exact arrangement depends upon the size of the machine and upon where it is installed in the foundry building. In some cases the dust is drawn into a hood at one side of the shakeout grate; in

Fig. 2—Larger molds usually are moved by overhead cranes to a mechanical shakeout on which they often must be supported during jarring

others two or more hoods are used, with a space between them at the top big enough to let the sling chain pass when heavy flasks are set on the machine with the overhead crane.

In some cases where shakeouts were originally installed without exhaust systems, the dust is drawn upward and out through ventilators in the foundry roof by means of powerful fans mounted upon vertical axes. However, in locations where houses or other buildings are located close to the foundry, sending the dust into the air in this way would be unsatisfactory.

When exhaust hoods are used, the dust-laden air drawn off by fans is carried to a collector and the dust disposed of either continuously or at regular intervals. Some dust collectors use cloth bags or screens and some wash the dust out with sprays of water in baffle chambers or other types of devices intended to bring the water in contact with all the dust.

Very large jobs, molded in pits or builtup flasks, can be removed from the sand only at the place where they were set up and poured. The flasks are taken off a section at a time, often unbolted and in pieces, and the sand is dug away from around the castings by hand. Air hammers with long chisel bars are used to loosen the sand until the castings can be lifted by the crane. As a rule, such pieces go to the "roughing floor" with cores and molding sand clinging to them, all of which is removed there by the cleaning gangs.

At the rough cleaning floor, very light work may go directly from the shakeout to tumbling barrels or to suitable equipment in which the cores and adhering sand are removed by pneumatic or mechanical sand or shot blast. The total amount of sand to be disposed of being comparatively small, these light castings generally are given this first cleaning before the heads and gates are removed. The latter operation is sometimes performed with mechanical sprue cutters, though today cutting torches are used more often for the purpose. Blasting heavier pieces before the heads and gates are cut or burned off is generally uneconomical, and it is better to give them a partial cleaning with air hammers and chisels or with air or mechanically driven devices designed to hold and rap them until all loose sand and cores fall away. A narrow area at the base of the heads and on the gates close to the casting is then chipped free of any tightly adhering sand, and the heads and gates are burned off with the torch. The castings then go to the shot blast room or blasting device, where the rest of the adhering sand is removed.

The really heavy pieces from which large amounts of core and molding sand must be removed on the roughing floor have, until recent years, been cleaned by gangs of men using air hammers and chisel bars. For this heavy and dusty work, larger machines have lately been developed. These devices (Fig. 3) usually are tripod mounted, and provided with long arms tipped with cutting points like rock drills, which are simultaneously rotated and subjected to the blows of an air-driven piston. With these machines, supplemented by hand-operated tools, the molding sand, cores and core rods and gaggers are knocked off as fast as possible, though still none too fast at best.

When the greater part of the sand and cores has been cleared away, the casting may go to the shot or sand blast for further cleaning. In a foundry that makes many heavy castings, the rough cleaning floor takes up a great deal of space, and a large force of men is required for the work. Rough cleaning of big castings is a slow, dusty and tedious job, and because it is done "in the dry," there appears to be no economical way of speeding it up.

Instead of doing the rough cleaning "dry," appa-

ratus may be employed which directs a high-velocity stream of sand and water against the work. The cleaning is done in an enclosed space, and the material removed from the castings passes through a grating to screens that hold back the gaggers, core rods, unbroken lumps of core sand and other material. The sand and water go to sump tanks, then to hydraulic classifiers where the clay and fines are removed. Part of the cleaned sand returns to the hydraulic blasting machine; the rest is de-watered and sent back to the foundry to be used as molding or core sand.

With hydraulic apparatus, therefore, rough cleaning and blasting are combined in a single operation, and the castings come from the blast room ready for removal of heads and gates and for chipping and grinding. The stream of water and sand not only knocks off the loose material adhering to the castings, but cleans out the cored holes thoroughly. The operation is much faster than hand cleaning, and of course it is also dustfree. In some plants hydraulic blast cleaning rooms are used not only for the very large and heavy castings, but also for smaller work, which is handled in batches on suitable racks set on a turntable or car.

Advantages and Disadvantages

As the wet blasting room is little if any larger than a sand or shot blast room, much less shop space is taken up for the rough cleaning operation than that required for hand cleaning in the dry. The cost of the installation, however, is somewhat higher than that of the air tools plus the shot or sand blast room required for dry cleaning. Hydraulic blasting, too, is not as efficient as shot blasting for the removal of annealing scale, so that a shot blast must be installed for that purpose.

When large tonnages are handled in shops that clean by hand and use sand or shot blast to finish the job, it is generally necessary to have one set of blast apparatus for rough cleaning and one to remove annealing scale. In smaller installations, however, a single shot blast room often can be used both to complete rough cleaning and to descale, and when business is slack in a large shop, both operations can be carried out in one blast room. When rough cleaning is done wet, the shot blast must always be used for descaling.

In contrast to the dusty work of rough cleaning dry, the operator of an hydraulic system usually stands outside the cleaning chamber, directing the nozzles and turning the castings about on a turntable by push buttons and levers. The roof of the room can be made movable so that instead of being pushed in on cars, large castings may be placed by the overhead crane. The operator needs to don a special suit and enter the blast room only when an auxiliary nozzle must be used to clean out cored holes that the main stream can not handle. Obviously, a far smaller force of men is required to do the rough cleaning than when the castings must be spread out on a large floor and handled by the old-fashioned poke-and-rattle method.

Since sand can be delivered to the washing plant without an extensive system of belts or other conveyors, hydraulic cleaning systems are particularly advantageous when the sand is to be cleaned completely before being re-used in the foundry, as described in the August and September, 1950 issues of FOUNDRY. If an hydraulic blast system is installed, any air-cleaning apparatus previously used would be dispensed with, of course.

Hydraulic blasting necessarily cools the castings nearly to atmospheric temperature, and for the general run of steel foundry work this is entirely satisfactory. If large, intricate castings of some of the alloy steels are cooled quickly to atmospheric temperature before a preliminary annealing, however, there is danger of setting up stresses in them heavy enough to create cracks or to enlarge existing ones. Were these pieces to be rough cleaned by wet methods, they therefore would have to go into the annealer first, and be handled in the blast room after they had cooled off. Sand adhering to such castings would make it hard to heat them evenly and economically. For work of this type, rough cleaning by hand, though crude and slow, is probably the better method.

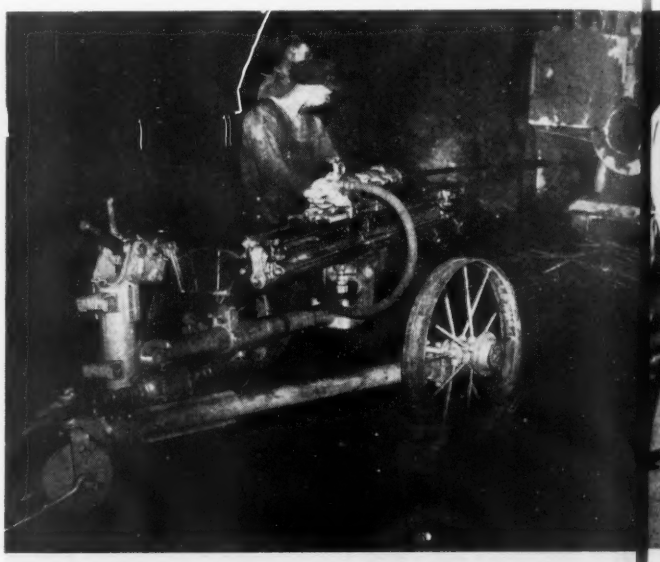

Fig. 3—Tripod-mounted, pneumatically operated device like a rock drill removes cores from castings

Castings made in cement-bonded sand are generally quite large and present a special problem in rough cleaning since the greater part of the mold retains its strength and is hard to break up after the castings have cooled. Hand cleaning is therefore about the only method that can be used. A great deal of the sand comes away from the castings in large lumps which must be broken up with sledges and put through a crusher before it can be re-used for backing sand. As described in the March, 1949 issue of FOUNDRY, some of the lumps are not crushed, but are used to fill parts of the molds, just as very coarse aggregate might be placed in a concrete structure.

The type of sand or shot blasting apparatus to

choose depends chiefly upon the size and shape of the work to be handled. For large or medium-sized castings, especially those of complicated shape, closed rooms in which the operator works inside and directs the stream of sand or shot at various parts of the piece, as a fireman aims his hose at a fire, are the most suitable type. To protect him from the flying particles of abrasive, the operator wears heavy gloves and a rubber or fiber apron or coveralls. His head is

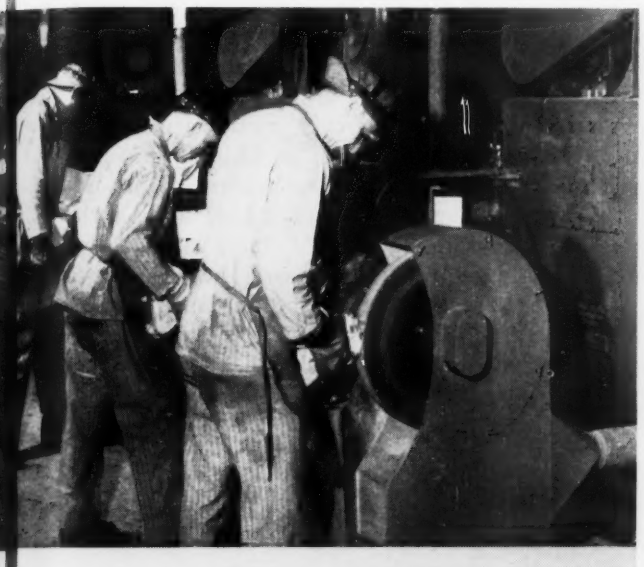

Fig. 4—Castings which can be lifted readily usually are dressed by hand on stand type grinding machines

enclosed in a special helmet arranged to furnish fresh air and provided with a window of transparent plastic covered by a sliding metal screen. With such a device, the operator breathes air quite as dustfree as that in any part of the foundry.

Somewhat lighter pieces are often cleaned in smaller chambers so arranged that the operator stands outside, like the operator of an hydraulic system, and directs the nozzle by means of suitable arms and levers. Castings small and light enough to be turned over without damage, are best cleaned in pneumatic or mechanical blast tumbling barrels. These machines have almost entirely superseded the plain tumbling barrel in modern steel foundries. The old-fashioned barrel, loaded with castings and with hard iron "stars" to knock adhering sand off the work, was quite cheap to operate. It did not do a really efficient job of cleaning, however, and produced a peened surface on the castings which frequently hid surface defects rather than disclosed them.

For this class of work, instead of blast apparatus in which the sand or shot is propelled by compressed air, centrifugal machines often are considered preferable. This type of apparatus uses either shot or grit which is driven against the work to be cleaned by a rapidly rotating wheel with radially mounted blades of abrasion-resisting material. The abrasive is fed in at a point near the axis of the wheel, slides along the surface of the blades, and is discharged at high velocity in a comparatively compact stream. Except for cleaning large numbers of identical big castings, these devices are not used in regular blast rooms as a blast hose and nozzle are because of the difficulty of handling a variety of castings of widely differing shapes in such a way that all parts of them are exposed to the stream of abrasive.

When the work can be turned over and over as it is cleaned, however, the abrasive strikes every part of the castings and does a most efficient job of sand removal. Some of these machines clean a batch at a time and as a rule are loaded and unloaded by means of mechanical devices. When a great many small castings are being handled on a continuous basis, they can be fed in at one end of a special type of blasting machine and discharged at the other end, with no time lost in loading and unloading. These devices need be shut down only for renewing the blades in the wheels and for any necessary repairs.

Use Metallic Shot or Grit

The centrifugal type machines are unsuitable for handling sand, and metallic shot or grit are always used in them. Manufacture of shot involves impingement of a jet of steam upon a small falling stream of alloy cast iron or very hard steel. The drops formed are cooled in water and are sometimes given further heat treatment to toughen them. Therefore the pellets are intensely hard and do not readily break up in use. Grit is produced by crushing metallic shot. Both materials are furnished in a number of grain sizes, depending upon the type of work being handled and the surface appearance desired—the smaller the particle size of the abrasive, the smoother the surface produced on the castings. When grit is used, a certain amount of shot is usually fed in with it, to make the machine operate properly.

The use of sand as an abrasive in pneumatic blasting machines has steadily declined for a number of years. Though cheaper than shot or grit, it breaks up much faster in use, and hence increases the amount of dust to be handled. In many states, laws designed to reduce the risk of silicosis in foundries either prohibit or greatly discourage the use of sand in blasting machines. The rapid break-down of sand in use largely offsets its lower cost too. W. A. Rosenberger[1] states that one ton of steel abrasive will do about the same amount of work as 40 tons of sand. As already stated, however, sand is the only abrasive used in hydraulic blasting apparatus.

One problem in cleaning large, heavy steel castings is the removal of penetrated sand from cored holes of small diameter in thick sections, and from re-entrant angles and intersections of heavy portions. As mentioned in the May, 1950, issue of FOUNDRY, the sand at these places is frequently converted into a solid mass in which the sand grains are cemented together by steel which has forced its way between them. The layer of penetrated sand may in extreme cases be 2 or 3 in. thick. Analysis of this material generally shows it to be roughly 50 per cent metal and 50 per cent sand. A gas torch will not cut it because

the sand so breaks up the continuity of the steel that the flame will not stay lighted. Drills are dulled by the particles of sand so fast that they will not penetrate.

The only way to remove this material is to use air hammers and chisels to cut it out in fragments. Hours and days of heavy, tedious work can be spent nibbling away a few cubic inches of sand, making the job so costly that sometimes it is cheaper to scrap the casting and make a new one than to clean the penetrated sand out of a cored hole or re-entrant angle. In the section on molding and core sands, (May, 1950) this matter is referred to, and possible means of preventing severe penetration are discussed. In at least one instance[2] an attempt has been made to remove penetrated sand by electrolytic cleaning in molten caustic soda, but this method may be too costly to be regularly employed.

Actually, penetrated sand adhering to plain surfaces is not removed by any form of blasting apparatus, but must be chipped off with hammer and chisel. To some extent, the scale formed by annealing, especially when high temperatures are used, takes off thin layers of penetrated sand. If the penetration has been severe and the sand adheres tightly to the steel, however, only chipping will remove it. In some cases, the sand need not be taken off at all; sometimes it may be left in place and removed on a roughing cut in the machine shop, but often it must be chipped from the work after blasting.

It is possible to remove thin layers of adhering sand from steel castings by pickling them in acid solutions, and this practice was formerly used by purchasers, especially for pieces of intricate shape. The steam passages in steam turbine casings, and other similar work, were often pickled to remove tightly adhering scale and sand which would damage the machine if it were left in place and came loose later, in service. In many plants, however, hydraulic sand blasting has superseded pickling for work of this sort.

As shown by Briggs and Gezelius[3] and mentioned in the former's book,[4] pickling is apt to form surface cracks in castings. Various solutions have been used, such as mixtures of hydrofluoric and hydrochloric acid for the removal of sand and sulphuric or hydrochloric acid for taking off scale. Inhibitors to minimize the attack on the steel itself are generally mixed in the solutions. The action of the acids leads to embrittlement of the steel by absorption of hydrogen, but this effect is mainly temporary, disappearing after about three days at atmospheric temperature or an hour in boiling water. Inhibitors reduce, but do not entirely prevent, hydrogen embrittlement.

As described in the section on heading and gating, necked-down heads and gates generally can be removed from the castings by flogging with a sledge hammer or a swinging "dolly." This is one of their chief advantages, the other being that they greatly reduce the time spent in grinding down the stubs left when the heads are removed. In breaking heads from castings, the operator should be careful not to persist in pounding at one with an extra-heavy neck, especially on a "green" casting of complicated shape. The stresses in the unannealed piece may be so high that the extra jar of a heavy blow on the head will crack the casting. Under these circumstances it is better to chip the sand out from under the head and burn through the neck with the torch.

Before the cutting torch was developed, gates on very small castings generally were cut through with mechanical sprue cutters, and those on larger pieces broken with sledge or dolly. (*Please turn to page* 251)

Fig. 5—Stubs of large heads and gates on castings too heavy to be handled easily are finished off smoothly by using swing frame grinders

QUALITY SUPERVISION

in the Small Jobbing Foundry

Preoccupied with the need to keep up with such essential ingredients of profitable operation as mechanization and new processes and materials, many small jobbing foundries have overlooked the human factor

By EUGENE FRY
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AS A GROUP, small jobbing foundries account for a huge proportion of the annual tonnage processed in metals. Many of these small plants, pressed by close competition and excessive costs, have kept pace mechanically with their larger production-line neighbors. In many instances, however, they have budgeted considerably less money and devoted less thought to bettering their human relations. Of money, materials, machines and men, they have found the latter to be the most complex and baffling element to co-ordinate with the others for a profitable operation.

THE MAGIC ANSWER

Yet throughout the years, management has had the answer for the controlled production of men —supervisors. With the problem's solution at their fingertips, they have left this highly skilled field of supervision in a near vacuum, with little or no coherent direction.

The urgent need for competent foremanship in the jobbing shop is greater than it is in a production plant. The necessary continual change in a jobbing foundry results in a tremendous task for the foreman who must follow through on the work from the gating and risering in the pattern department through the coreroom, molding, sand preparation, melting, pouring, shakeout, cleaning and inspection.

MECHANIZATION WITH HUMANIZATION

A successful cycle requires the same thorough supervision for an order of one casting as for one of many hundreds. On a long-run pattern, for instance, the production plant would in all probability, cast a sample before gearing for peak production. But the small jobbing foundry could not economically run a sample of a one casting order. Obviously, despite a degree of modern mechanization, this type of production must rely heavily upon the human element. Mechanization means a lot of machinery; humanization means a lot of the right kind of supervision. Both must be employed sensibly, or the overall program is inadequate.

Belatedly, the jobbing foundries are becoming aware of the fact that money invested in materials and machines, though necessary and desirable, is a bad investment without a comprehensive program to better management-supervisor-employee relations. The more progressive organizations realize that their foremen are perched precariously astride a mythical fence, a daily go-between for the average worker and the front office. These men hold the key to profits or losses in their behavior.

SELECTION OF SUPERVISORS

Since the supervisor is so important to industry, his selection should be based on personality, experience, formal education and his capacity for good common sense. The policy in some foundries in the past was to place a bull-like individual who operated on a "work-or-else" basis over a shift of men. Fortunately, this trend toward selecting foremen with strong physical attributes rather than mental ability has been reversed.

Perhaps your jobbing foundry is endowed with a "good crew." Your foremen are doing a "good" job. But you do have "headaches." Does your personnel manager complain of the vast turnover in manpower, much of it during the first two months employees work for the company? Is a sizeable chunk of your scrap heap due to a relatively new worker's production? Does your high insurance rate reflect new employee injury frequency?

As a specific case in point, one midwestern jobbing foundry, having spent a great deal for new equipment, was, after six months of trial effort, actually turning out fewer tons than before the mechanization had been launched. Mounting costs of hiring and separating droves of workers, of wasted manhours and of spiraling scrap graphs focused (*Please turn to page* 248)

Grain Refinement of Magnesium Castings

Use of hexachlorobenzene as a grain refining agent for magnesium gives improved metal properties and lower operating costs, the author states in his paper given at the Magnesium Association's 1952 annual meeting

By ROBERT T. WOOD
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Aluminum Co. of America, Cleveland

IT IS well known that magnesium alloy castings tend to have comparatively coarse grain structure and low mechanical properties unless some means of grain refinement is employed in the melting procedure. For many years the accepted method of grain refinement was to superheat the metal to 480°-750° F above the liquidus temperature, as described in British Patent No. 359425, granted I. G. Farbenindustrie in 1931.

For practical purposes, this meant heating the metal to 1650°-1750° F prior to cooling to the pouring temperature. During the next ten years or more, there was considerable speculation regarding why superheating brought about grain refinement in magnesium alloys. The metallurgists of I. G. Farbenindustrie believed it was caused by iron picked up from the crucible. The solubility of iron in magnesium is quite sensitive to temperature change, and it was postulated that as the metal cooled, the iron became insoluble and acted as nuclei for grains.

Others proposed that the grain refinement effect was caused by the absence of nuclei and the refinement by supercooling. The hypothesis that iron particles acted as nuclei for grains resulted in an iron inoculation procedure developed by the metallurgists of I. G. Farbenindustrie and called the Elfinal process.[1]

In the Elfinal process, ferric chloride is introduced into the molten magnesium alloy and produces a grain refining effect similar to that obtained by superheating. Like superheating, the Elfinal process is ineffective in producing grain refinement unless the magnesium alloy contains more than about 3 per cent aluminum.

It is known that the I. G. Farbenindustrie metallurgists investigated the grain refining effects of a large number of organic and inorganic substances during and prior to 1942. They found that a great many organic compounds were effective grain refiners and that PCl_3, $FeCl_3$, $SbCl_5$, Na_2CO_3, BCl_3 and $SiCl_4$ were also effective to some degree.[2]

In spite of the favorable test results obtained by the use of organic substances, I. G. Farbenindustrie and its licensees continued to use $FeCl_3$ as the grain refining agent in production foundries until these foundries ceased operation in 1945.

Independent of the work in Germany, experiments on the grain refining of magnesium alloys began in this country in 1942. The initial work appears to have been done at Dow Chemical Co. by Nelson and Holdeman[3] on carbon monoxide. Mahoney, Lee, Tarr and Le Grande[4] at Las Vegas, Nev., apparently investigated the effect of a variety of organic and inorganic compounds as well as that finely divided carbon or graphite. Work on carbonaceous gases also was carried out at Battelle Memorial Institute by Eastwood, Davis and DeHaven.[5]

The Battelle investigators and others found that natural gas, acetylene, carbon monoxide, carbon dioxide and a combination of chlorine and carbon tetrachloride bubbled through the molten metal all caused grain refinement. It also has been noted that mechanical agitation[6] with or without additions of finely divided carbonaceous matter brought about grain refinement. The fact that treatment with carbonaceous matter is effective when aluminum is present in the magnesium alloy suggested that a compound containing aluminum and carbon is the nucleating agent in grain refinement. Davis and his co-workers at Battelle did achieve grain refinement by adding aluminum carbide to magnesium alloys.[7]

It is not within the scope of this paper to deal with the theoretical aspects[8] of grain refinement, although it may be noted in passing that zirconium is a powerful grain refining agent for pure magnesium and for many magnesium base alloys which are not amenable to refinement by carbon inoculation. Rather, this paper will describe in detail a very practical and successful method of grain refinement which has been used in the magnesium foundries of Alcoa since 1944.

Experimental Work — (*Please turn to page* 256)

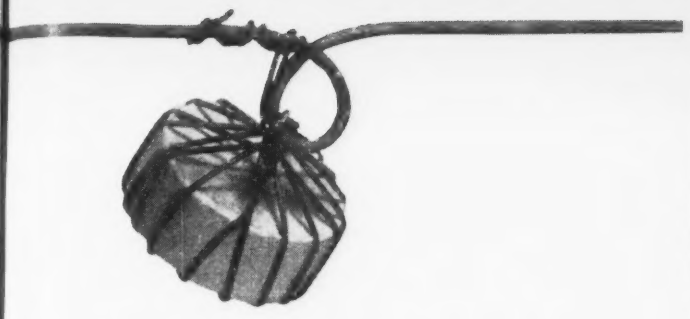


Fig. 1—Fastening the grain refining material to a loop in a rod or wire prevents contact with a flux heel which might be in the crucible bottom

Fig. 2—Grain refining material can be used as a briquet or in powder form wrapped in aluminum foil. Soft iron wire is used as binding

TABLE I—Tensile Properties of AZ92-T4 Test Bars from Metal Refined with Naphthalene

Ingot Batch[1]	Grain Refining Addition	Tensile Strength, psi.[2]	Elong. % in 2"
Diamond 250G	none	33,800	8.0
Diamond 250G	none	32,000	7.2
Diamond 250G	21 g naphthalene	42,200	13.4
Diamond 250G	superheated	42,500	13.8
Dow C-1752	none	34,500	7.8
Dow C-1752	11 g naphthalene	34,700	8.4
Dow C-1752	17 g naphthalene	38,900	10.3
Dow C-1752	24 g naphthalene	40,700	11.1

1. 70 pound melts. 2. Average of 18 bars.

TABLE II—Average Tensile Properties of AZ92-T4 Test Bars Poured from 400 Pound Crucibles Treated with Hexachlorobenzene

Crucible No.	Amount of C_6Cl_6 Used (grams.)	Tensile Str., psi[1]	Elongation, % in 2"
A	60	44,000	13.0
B	80	43,200	14.5
C	100	43,200	13.0
D	100	42,600	10.8
E	120	41,100	9.9

1. Average of six tests.

TABLE III—Average Tensile Properties and Grain Size of AZ92-T4 Test Bars from Various 60 Pound Melts Treated with Hexachlorobenzene

——Type of Charge—— Ingot %	Secondary %	Remelt* %	Amount of C_6Cl_6 Used (g)	Tensile Strength psi[1]	Elong. % in 2"[1]	Average Grain Diam., (in.)
100	...	..	0	37,300	8.7	0.0068
100	...	..	8	42,700	13.5	0.0043
100	...	..	12	44,000	13.4	0.0030
100	...	..	16	43,500	12.5	0.0032
100	...	..	20	42,100	11.8	0.0030
...	100	..	4	42,100	12.5	0.0045
...	100	..	12	43,200	13.5	0.0035
10	10	80	0	43,400	14.2	0.0030
10	10	80	8	43,000	12.1	0.0033
10	10	80	12	43,800	14.4	0.0032
10	10	80	16	43,300	14.9	0.0031
10	10	80	24	43,400	14.6	0.0033

1. Average of 15 test bars. * "Remelt" metal previously treated with hexachlorobenzene.

TABLE IV—Average Tensile Properties of AZ63-T4 Test Bars from Melts Treated with Various Amounts of Hexachlorobenzene

Amount of C_6Cl_6 Used (Grams)	Tensile Strength,[1] psi	Elongation[1] % in 2"
0	34,600	10.6
4	36,800	11.8
8	38,100	12.4
12	36,900	13.8
16	41,900	16.2
20	41,200	16.0
24	41,800	16.3

1. Average of 15 bars.

TABLE V—Consumption of Flux, Fuel and Crucibles In Sand Foundry. Grain Refinement by Superheating Versus Grain Refinement by Hexachlorobenzene

Material	Average Monthly Consumption When Superheating	Average Monthly Consumption When Using C_6Cl_6	Savings in Per Cent
Flux	14,463 pounds	12,516	13.0
400 lb. crucibles	19	5	74.0
70 lb. crucibles	7	3	57.0
Natural gas*	1,619,696 cu. ft.	1,278,862	21.0

* Gas consumed in 400-lb. and 70-lb. furnaces. Average monthly consumption of C_6Cl_6 during period was 400 lb.

TABLE VI—Accelerated Corrosion Tests on Cast Magnesium Alloys Treated With C_6Cl_6 or Superheated

Alloy and Condition[1,2]	Grain Refining Treatment[3]	Blank Properties T.S.	Blank Properties % El	% Change[4] 4 Weeks Cont. Salt Spray T.S.	% Change[4] 4 Weeks Cont. Salt Spray % El	% Change[5] 1 Week Alt. Immersion T.S.	% Change[5] 1 Week Alt. Immersion % El	Iron Content by Analysis %
AZ92-T6 SC	superheated	40,260	1.8	—62.6	—58	—62.6	—58	0.037
AZ92-T6 SC	30 g. C_6Cl_6	43,600	3.4	—66.2	—76	—37.0	—74	0.016
AZ63-T6 SC	superheated	41,700	5.9	—46.0	—81	—37.9	—70	0.034
AZ63-T6 SC	30 g. C_6Cl_6	42,140	6.4	—49.6	—78	—26.5	—59	0.014
AM100-T4 PM	superheated	37,450	9.1	—24.3	—44	—74.3	—68	0.018
AM100-T4 PM	10 g. C_6Cl_6	37,000	8.9	—23.4	—42	—22.0	—28	0.011
AM100-T4 PM	20 g. C_6Cl_6	36,780	9.4	—24.8	—35	—65.5	—70	0.015
AZ92-T6 PM	superheated	39,250	2.4	— 6.2	— 4	— 7.4	—12	0.009
AZ92-T6 PM	10 g. C_6Cl_6	39,570	2.7	—13.0	—26	— 8.5	—19	0.006
AZ92-T6 PM	20 g. C_6Cl_6	41,330	2.6	— 7.2	—12	— 1.5	+ 4	0.006

1. SC = Sand cast PM = Permanent mold cast
2. Test bars were dipped 5 minutes in 15-20% HF solution and chrome pickled after solution heat treatment. Exposed at 86° F. Eight duplicate bars tested in each condition.
3. Hexachlorobenzene (C_6Cl_6) amounts given in grams per 100 pounds of metal treated.
4. 3½% sodium chloride spray.
5. 3% sodium chloride solution.

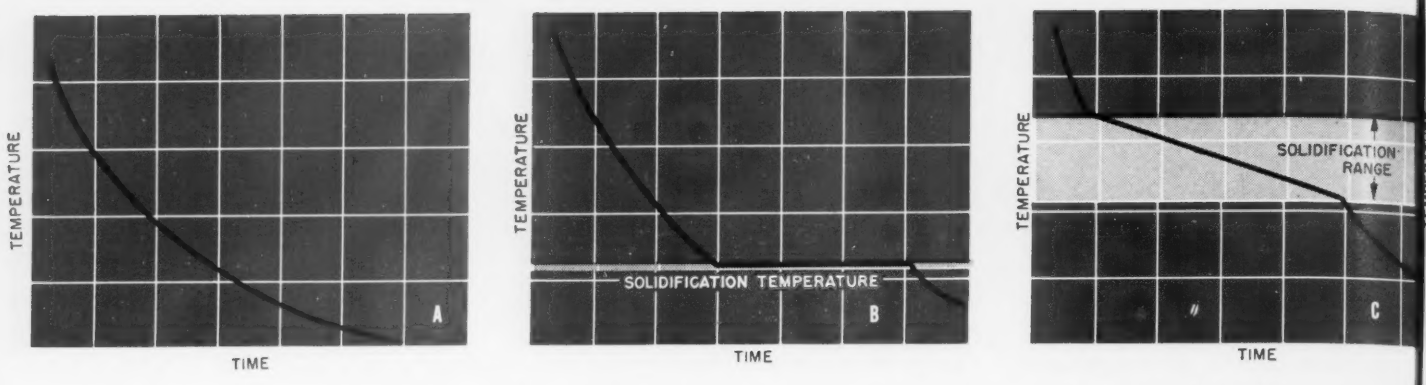


Fig. 1—Time-temperature curves of various materials. *A*: Any hot solid cooling toward room temperature. *B*: Pure metal or eutectic alloy. *C*: Solid solution type alloy. *D*: An alloy with more or less than the eutectic composition

The Principles of Risering

There is no simple approach to the risering of castings. However, an understanding of the fundamentals of metal solidification and riser application can assist the foundryman in this important phase of good foundry practice. The author is on leave as assistant professor of metallurgical engineering, Case Institute of Technology, Cleveland, to serve with the French foundry team of the Mutual Security Agency

By CHARLES F. WALTON

ALTHOUGH several methods have been devised for determining the proper type of riser, and tables or formulas have been drawn up for the calculation of proper riser size, no simple approach to the risering of castings exists. Because of the large number of variables involved in risering, any automatic method must omit some of the variables or leave them to the decision of the foundryman using the method.

These variables require considerable reliance upon the experience of the foundryman. Concerning some factors, we have either little understanding from which to derive equations or no numerical data from which to make computations. Attempts to establish a simple rule or formula method of determining risers sacrifice the highest obtainable safety factor or the reliability of the system to produce consistently sound castings.

Notwithstanding these difficulties, modern foundry practice has developed a good deal of knowledge of risering, and recent research work has revealed much fundamental information concerning the solidification of metals in molds. Although a statement of these principles will not teach one how to riser commercial castings successfully, a knowledge of principles will help foundrymen to utilize their experience and allow them to do a more rapid, satisfactory and accurate job of rigging work for production than they could otherwise.

A riser is applied to a casting for five reasons:

1. To vent the mold cavity.
2. To avoid hydraulic ram effect.
3. To indicate when a mold is full.
4. To flow off cold metal.
5. To absorb liquid contraction.

Eliminating air in a mold cavity as it is replaced with molten metal is a real problem in permanent mold casting and in dry sand casting when molds have been coated with a comparatively impervious blacking. In both instances, an escape for the air might well be added to the mold. In green sand molding, however, the volume of air displaced from the mold cavity is a small percentage of the total volume of gases that must leave the mold when the molten metal enters.

Water expands approximately 5000 times when it turns to steam. If the sand is not permeable enough to carry the steam and the relatively small amount of air from the mold cavity, it is likely that the green sand is too low in permeability. There are times, however, particularly in production that calls for high pouring rates, when the addition of a whistler to the mold will greatly facilitate the rate at which metal

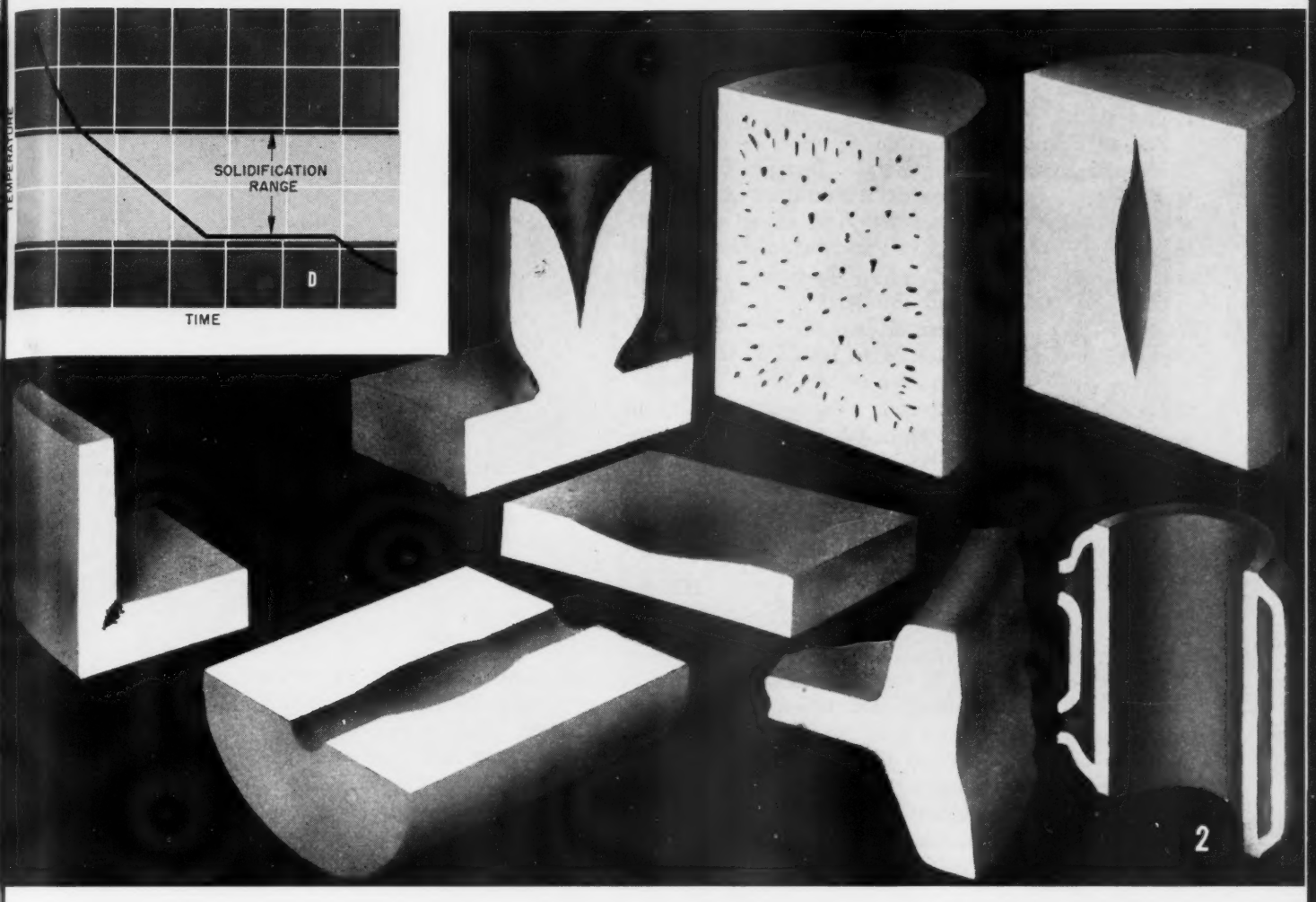


Fig. 2—Illustrating the various ways in which solidification shrinkage can occur in castings

can be poured and help to avoid defects that might otherwise occur, such as cold shuts, misruns and apparent blows. In addition, although a vent or whistler will not eliminate a shrink, it often will move or distribute it so that a commercially sound casting can be produced.

The second reason for using a riser is to avoid hydraulic ram effect, commonly called "strain" by foundrymen. An object in motion has an energy of motion, or kinetic energy, which is released when the object is stopped. When an automobile is stopped, for example, the energy of motion is dissipated as heat in the brakedrums. When a liquid confined in a pipe is in motion and is suddenly stopped, the energy is dissipated as a pressure head. Turning off a water faucet frequently produces a pound or hydraulic hammer.

Similarly, when metal flowing in a gating system comes to a stop suddenly because the mold is full, the energy of movement is translated into additional pressure in the mold. This condition is most serious where the cope area is large and flat. Such a mold with a small whistler through the cope often throws about a tablespoonful of metal several feet through the air because of the sudden pressure developed by the hydraulic ram effect. Attaching a riser to the casting so that metal continues to flow into the riser, instead of coming to a stop, eliminates the pressure head and avoids the possibility of a run-out or of a strained casting.

The third reason for using a riser is to indicate when a mold is full. Despite its simplicity, this function is particularly important today. In many foundries, molds are poured by men other than those who make them; consequently, the pourer does not know how much metal is needed to fill a mold. With a blind mold, the pourer tends to stop or to slow up too soon. When the stream is restarted, slag may be drawn past the traps in the casting cavity. The use of open risers entails several disadvantages, too, of course, and these must be weighed against the advantages.

The fourth reason for employing a riser is to flow off cold metal. It often is not possible to pour a mold as fast or as hot as would be necessary to insure no misruns or cold shuts in the casting. Heavily cored work frequently comes in this category. When metal starts to flow over a core, many times it does not completely cover the core until sufficient head of metal is developed to make the metal lie against the core and force the gas to exhaust through the core vent.

If the core is covered by only a small amount of metal, this delay can cause a cold shut or a misrun.

Such a difficulty can be avoided in some work if a part of the metal is allowed to flow out of the mold at the critical area and pouring is continued until there is assurance that the casting cavity is filled with molten metal.

The fifth and last function of risers is to absorb the liquid contraction of metal. In spite of all the work that has been done on the subject of risering, shrinkage is still the most prevalent cause of defects in castings. Metal actually undergoes three contractions during its cooling and solidification in a mold.

Since metal is poured into the mold with super heat—that is, at some temperature above that of solidification, liquid contraction is the first to take place in the metal. Liquid contraction is exemplified by an ordinary mercury thermometer, the mercury in which rises and falls (expands and contracts) with the temperature. Part of the liquid contraction is provided for while the casting is being poured, for the first metal into the mold is rapidly approaching or actually at the solidification temperature.

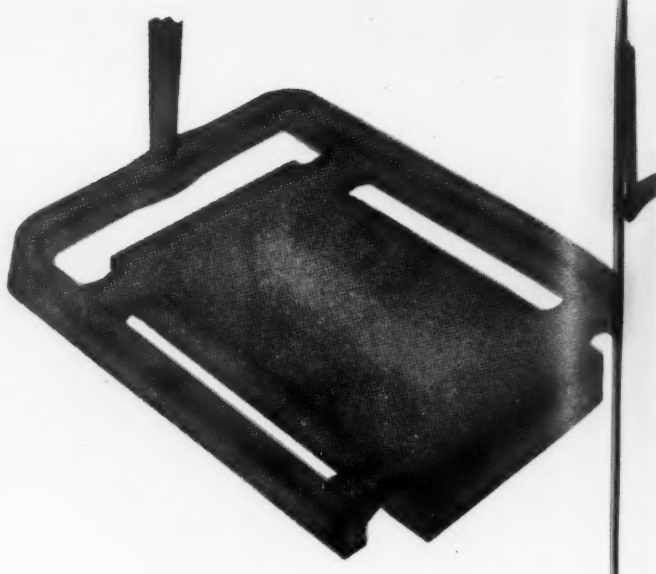


Fig. 3—This gating system distributes the metal as uniformly as possible throughout the casting

Change from Liquid to Solid

The gating system will provide additional metal until it freezes off. The balance of the liquid contraction, the solidification contraction, occurs when the metal changes from a liquid to a solid and in most castings must be provided for by an adequate riser. The third, or solid, contraction of metal is that which is provided for by the patternmaker's shrink rule.

Confusion between solidification and solid contraction is not uncommon, partially because risering can influence the final size of a casting. The amount of liquid and solid contraction that occurs in a casting is a function of the metal being poured, the way the mold is made and the material with which the mold is constructed.

In Fig. 1, the graphs plot metal temperature vertically and a time scale horizontally. Curve A depicts the temperature of any hot solid as it cools toward room temperature. Temperature drops rapidly at first, then more slowly as it approaches that of the surroundings, but there is no particular phase change in this body as it is cooled.

Curve B illustrates the cooling pattern of a pure metal. It cools rapidly until solidification temperature is reached, holds at this temperature until it is entirely solidified, then drops again, but at a different rate from that of the liquid phase. This type of constant solidification is typical not only of pure metals, but also of eutectic alloys, like the softer grades of gray cast iron.

Curve C illustrates the cooling rate pattern of alloys of the solid solution type. Solidification begins at one temperature and continues progressively until a second temperature is reached, at which solidification is complete. Steel is typical of this type of alloy, and certain of the more-difficult-to-cast nonferrous alloys also solidify in this manner.

The fourth curve represents the cooling pattern of a hyper- or hypoeutectic alloy (an alloy of an eutectic system, but with more or less than the eutectic composition). Solidification in this instance starts at one temperature and progresses continuously with cooling to another, where the drop stops and remaining solidification is completed at a constant temperature. This type of solidification, in which a mushy condition can exist over a rather wide range of temperature, is typified by the solidification of malleable iron and the high-strength grades of gray cast irons.

These differences in the ways various casting alloys solidify comprise one of the fundamental reasons why the most advantageous risering practice in one foundry may not be the same in another, pouring a different metal. These differences also influence the way shrinkage occurs in a casting. Fig. 2 illustrates the various ways solidification shrinkage occurs in castings. The sectioned cylindrical casting (second from top right) shows the general internal porosity which is commonly the result of a combination of gaseous metal and shrinkage. This porosity, of course, absorbs the volumetric change resulting from solidification shrinkage.

The cylinder on the right side illustrates typical center-line shrinkage. Such a defect results when a casting solidifies from all surfaces inward and completes solidification without enough metal to fill the entire cavity. If there were no gas in the metal, that cavity would be under a vacuum. Generally, however, it is at some pressure below atmospheric. To contain such a cavity, a casting must support the atmospheric pressure on its outside surfaces. Solid solution type alloys solidifying over a range of temperature generally can develop sufficient strength during solidification to support an internal cavity. Consequently, center line-shrinkage is typical of solid solution type alloys, of which steel, of course, is a common example.

The flat slab casting shown in the bottom center view illustrates cope draw shrinkage, a common occurrence in eutectic type alloys. It occurs in a fashion contrary to that of center line shrinkage. A center-line shrink may try to develop, but the soft, mushy condition of the partially solidified metal is generally not capable of supporting an internal void. The cast-

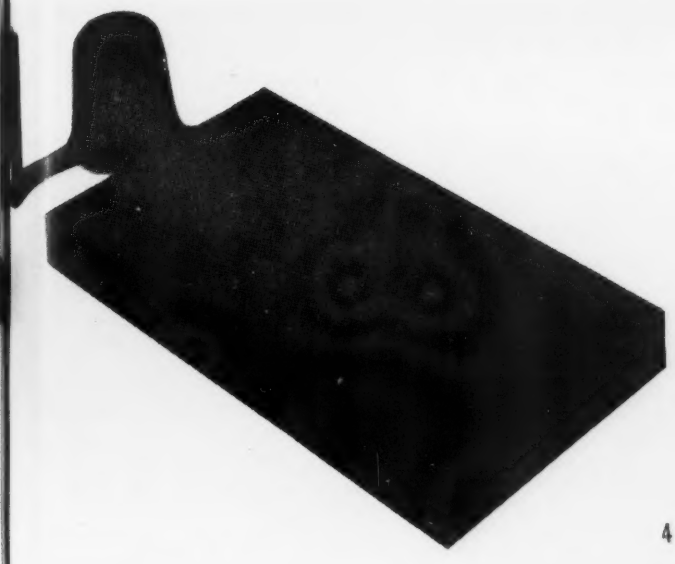
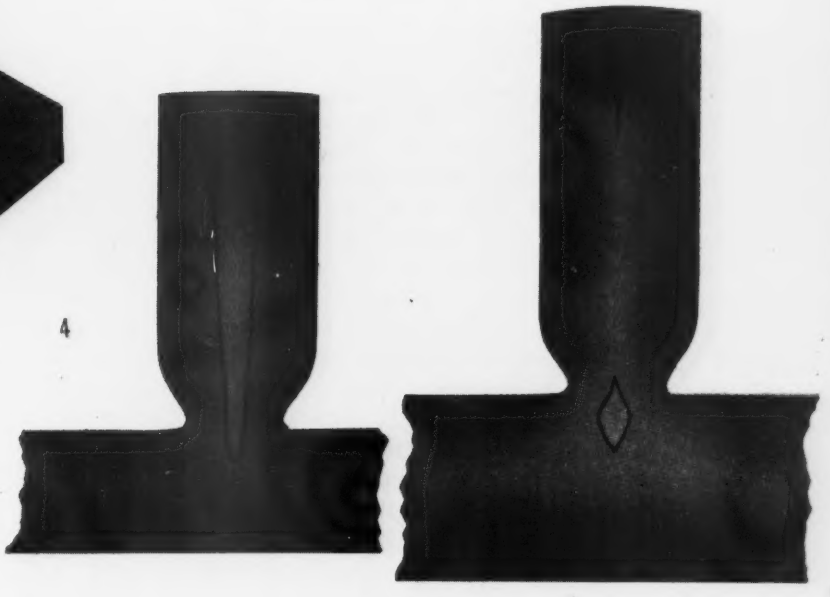


Fig. 4—In common directional gating, the coldest metal is farthest from the gate

Fig. 5 (below)—Riser at right is not large enough in diameter to keep metal liquid longer than that in casting. Riser at left had insufficient metal to feed the casting entirely during solidification



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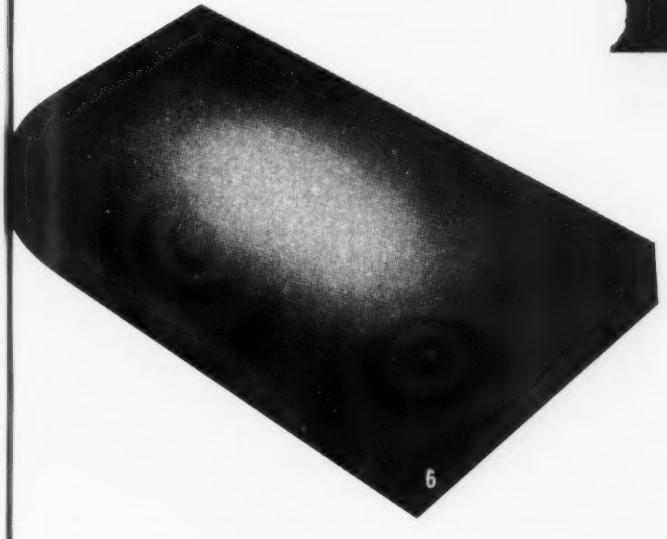

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Fig. 6—Cooling gradients that would develop if a mold could be filled instantly with metal all at the same temperature. The corners cool first

ing collapses, and the shrinkage appears externally. Internal shrink holes in gray cast iron, for example, almost always have an opening to the atmosphere. When there is no external opening, gas is usually considered responsible for the defect. The T-shaped section of a gear blank shows a similar draw-in on a sidewall, for the center of the T section is the last place to solidify.

The L-shaped casting on the left illustrates the occurrence of shrinkage on a re-entrant angle where the concentration of heat localizes the shrinkage into a small area. Similarly, a small core through a large section, as illustrated at the left bottom, may provide the hot surface from which the casting shrinks, for this place is the last in which the metal solidifies.

The cored cylinder casting on the right is a sound casting since a large, thin core is completely surrounded by metal except for prints. By expanding during the solidification of the metal, the core absorbs the volume change and can produce a sound casting without a riser. In heavily cored work such as this, metal often actually rises in a small riser on top of a casting before it solidifies because the cores have expanded beyond the point required to absorb the contraction of the metal.

The casting at left center illustrates absorption of the shrinkage of metal in a properly applied top riser and shows that the way metal solidifies influences the occurrence of shrinkage and the type of risering most likely to produce a sound casting.

Solidification of metal in a mold involves a transfer of heat from the metal to its surroundings. As a result, the solidification rate of a casting is regulated by the total quantity of heat liberated during the solidification process and how that heat is transferred to surrounding mold material. The amount of heat in a casting is a function of the pouring temperature and the alloy of which the casting is made, involving its latent heat of fusion and the volume of metal contained in the casting.

Superheat is usually a small quantity compared to the latent heat of fusion, but it often is very important. The transfer of heat from casting to mold is a considerably complex function. Two important elements are involved: Amount of casting surface area, and ability of the mold surface to extract heat. Much work has been done utilizing the volume surface ratio of a casting to predict its cooling rate. This ratio can be of real value for such a purpose, but it must be used with caution since the surfaces of all molds are not equally free to absorb and transfer heat.

The way a casting is gated particularly influences the way it solidifies because the flow of metal into the mold has a decided influence on the relative ability of various parts of the mold to absorb heat. The smaller the casting, the more important gating becomes.

The mold surface absorbs heat from the metal in two ways. First, the mold material directly adjacent to the metal is heated up to a temperature approaching that of the metal. In sand molds, the volatilization of water, seacoal, core oil or other ingredients helps to absorb heat, but may not necessarily speed up the process. Second, the mold material conducts heat away from the casting surface. This process absorbs heat much more slowly than the first, particularly in sand molds, because sand is a poor thermal conductor. The importance of gating is emphasized by that fact.

If the surface of a mold is heated to or above solidification temperature by metal flowing into it, the absorption of heat can take place only by the second, slower process—conduction. Metal which comes to rest on a cold portion of the mold cools fast. Where sections are light or castings thin, the heating of the mold surface may suffice in itself to solidify the metal. As the casting section becomes larger, the flow pattern of the metal into the mold becomes of less importance. The entire surface of the mold cavity of a heavy casting is to some depth at the solidification temperature of the metal before solidification has proceeded very far.

Fig. 6 illustrates the cooling gradients which could develop in what might be called a theoretical casting, the mold for which is filled instantly with metal all at the same temperature. Such a uniform temperature distribution would result when a block of metal is withdrawn from a heat treating furnace after having been heated to a uniform temperature. Obviously, the cooling rate at the corners of the casting would be the most rapid. Heat could radiate from there in three directions.

Radiation Progresses in Two Directions

The second fastest cooling rate would be along the edges, where radiation could progress in two directions. Cooling would be slowest on flat surfaces, from which heat would radiate in but one direction.

Perhaps the closest approach to such a condition in a foundry would be in the nondirectional gating system shown in Fig. 3, distributing the metal as uniformly as possible throughout the entire casting. Such a gating system would be desirable during the casting of a nonshrinking metal or of a casting in which uniformly distributed shrinkage was not objectionable.

The more common directional gating is illustrated in Fig. 4. Metal flows across the casting progressively from one side to the other, cooling as it flows while the sand face of the mold becomes preheated. Thus the coldest metal is farthest from the gate, and the hottest mold face is closest. This system produces directional solidification starting at the far end of the casting and progressing across it toward the gate and out into the shrink bob. Such a method best assures a sound casting, true to pattern, but the velocity of solidification across the casting must be sufficiently great so that isolated pools of liquid metal are not left behind. Insufficient temperature gradient often causes general porosity or micro-shrinkage. Slow pouring with hot metal favors directional solidification.

The effect of gating and the resulting flow pattern of metal as it fills a casting cavity is shown in Fig. 8, in which halves of castings are illustrated. When the casting was made in the drag, the metal flowed into the casting and over the re-entrant (inside) angle on the gate side of the casting. When the nonrisered casting solidified, shrinkage occurred not only in the center of the cope, but also at the point where sand was heated as the mold filled. When the same casting was made in the cope, incoming metal flooded the entire bottom surface of the casting cavity. Shrinkage was concentrated in the top of the heavy section since no one portion of the mold was selectively heated.

Gate Through Light Section

It is entirely possible with small castings to reverse the order of solidification of a heavy and a light section, making the light section freeze after the heavy section by gating through the light section. The importance of flow becomes less in larger castings, and the flow of metal over the surface of the mold for a very large casting has little to do with direction or rate of solidification because there is a large amount of heat to be dissipated through a given mold wall.

In order to absorb the solidification contraction of a casting successfully, a riser must meet three conditions:

1. It must be applied to the casting at the point or points which solidify last.
2. The riser must stay liquid longer than the casting.
3. The riser must contain sufficient liquid to feed the casting during its solidification.

The importance of attaching the riser to the point which is likely to shrink is obvious. A riser attached to a different point may fulfill all the other functions of a riser except the absorption of solidification shrinkage. Nevertheless, risers are often placed for the convenience of molding, not where they will absorb that shrinkage.

The second and third requirements of risers, as listed above, are, of course, closely related. Fig. 5 illustrates the failure to observe these needs and the defective castings that result in each instance. The view at the right shows a section of a large casting made with a riser not large enough in diameter to keep the metal in it liquid longer than that in the casting. This riser produced a hot spot in the casting at the point where the riser was applied, and a shrinkage cavity resulted at the point of attachment.

The illustration on the left in Fig. 5 shows a similar defect which resulted from a somewhat different cause. Although the casting was not as thick and the riser stayed liquid longer than the casting, it did not contain enough metal to supply the needs of the casting completely during solidification. Consequently, a defect occurred.

Practically, a riser does not need to develop a pipe through its entire diameter before this effect can cre-

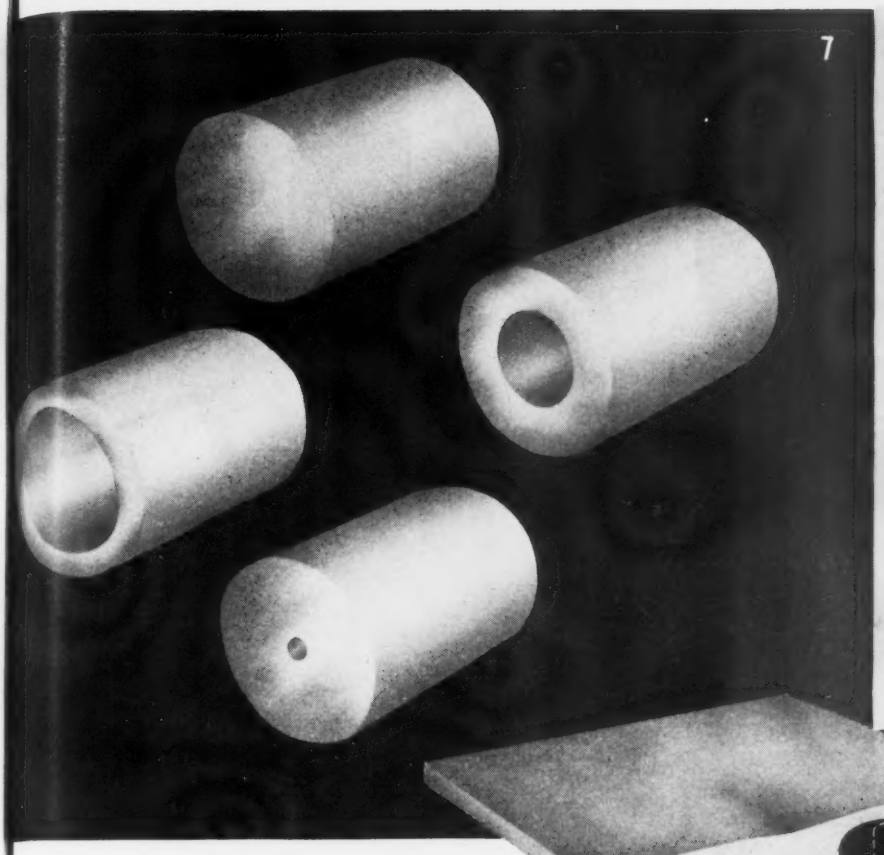

Fig. 7—Volume-surface ratio is helpful in evaluating a casting's effective section, if used with care

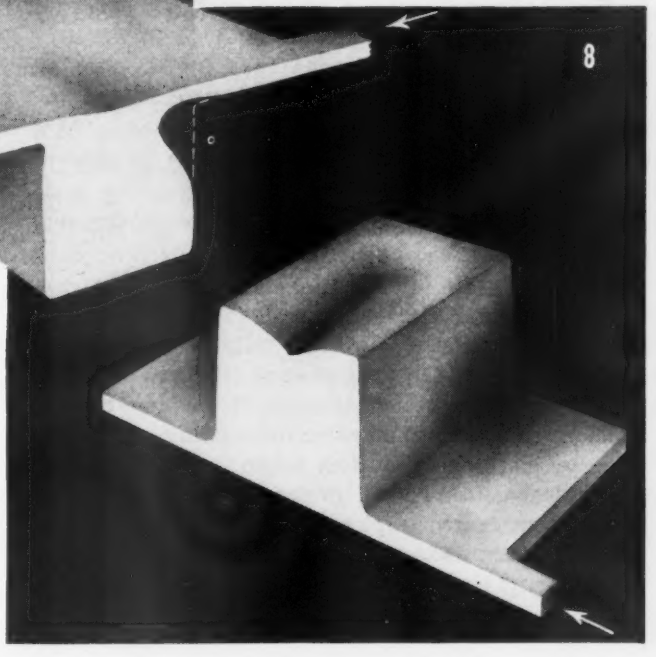

Fig. 8—Showing the effect of gating and the resulting flow pattern of metal as it fills a casting cavity

ate a defect. To assist in establishing how large the diameter of a riser must be in order to feed a casting properly, the term "effective section" has been devised. The effective section of a large plate is simply its thickness, but the effective section of a square bar 2 in. on each side is not necessarily 2 in. thick since the bar solidifies from all four sides at the same time. The effective section of such a shape would be less than 2 in.—probably about 1.4 in. in effective thickness. That is, its thermally effective thickness would be equivalent to that of a flat plate 1.4 in. thick.

The ratio of casting volume to surface area is a helpful tool in the evaluation of a casting's effective section. Dividing the weight or volume of a casting by its surface area establishes a ratio between heat input and radiating surface, but it must be used with skill. Fig. 7 illustrates some of the ratio's limitations.

The effective section of the solid cylinder in the top view is fairly easy to establish since all the surfaces of this casting are capable of absorbing heat. The thin-walled cylinder on the left has an effective section about equal to the wall thickness, for both internal and external surfaces are capable of absorbing the heat of solidification.

It is obvious that the surface of the small core extending through the diameter of the bottom casting cannot be considered part of the casting surface in a calculation of the volume surface ratio. In fact, this casting might actually solidify slower than the solid one.

Whether the core surface of the casting on the right can absorb heat effectively during solidification becomes problematical. Some authorities have suggested that a core surface should be considered a free surface so long as its diameter equals or exceeds one-half the total diameter of the cylinder. Apparently, then, the complex shapes characteristic of castings rule out any simple mathematical method of determining effective section. There are only two satisfactory approaches:

1. Through a good guess established by experience.
2. Through actual measurement of solidification rates.

Determining actual or relative solidification rates is not really difficult and should be practiced more by

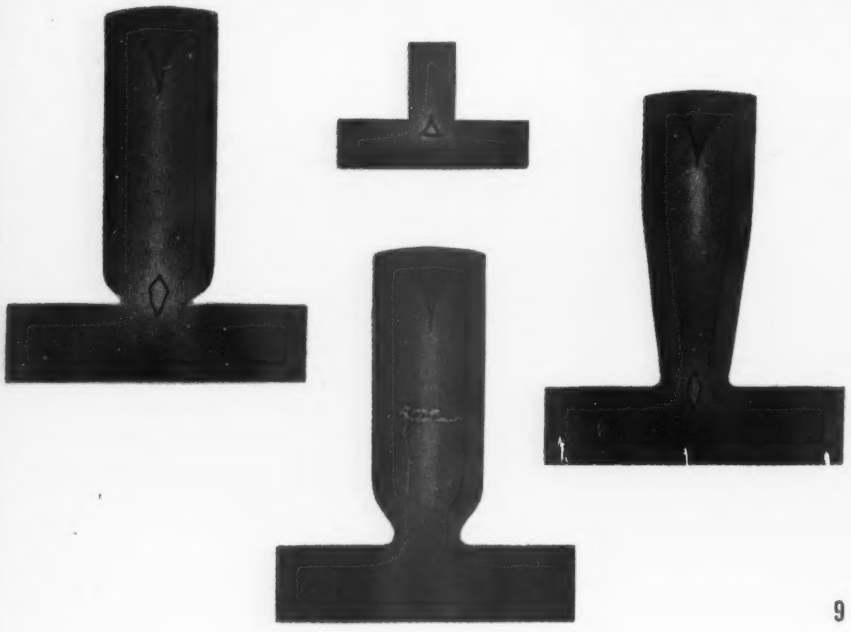

Fig. 9—Correct tapering of top riser is necessary to draw hot spot entirely up into the riser

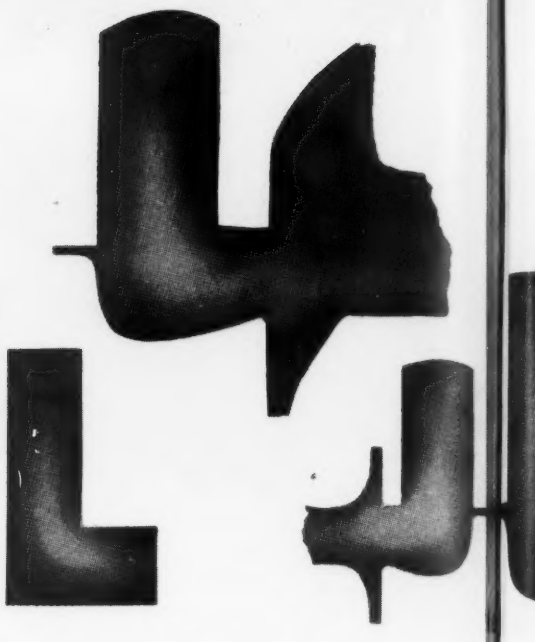

Fig. 10—Caution is necessary when a side riser is used with a casting extending into the cope

foundrymen than it is. Thermocouples embedded in a casting can do the job. Equipment for this type of work is not expensive, and the setup need not be nearly as elaborate as some research papers on the subject indicate.

Where moderate and small sized castings are concerned, a method of checking solidification is readily available to foundrymen. Since only relative cooling rates are needed, the shakeout of trial castings provides a rapid, simple method to determine relative solidification in various parts of casting and riser. Those parts that are hottest probably solidified last. Nonferrous metals do not evidence their temperature by color, but touch couples (hand-held thermoelectric pyrometers) can ascertain the temperatures at various points in the casting right after shakeout. The smaller a casting is, the more effective this method becomes.

Once the size of the riser has been determined by the time of solidification, it is necessary to figure the amount of metal needed to feed the casting during solidification. Figures have been established for the shrinkage of most casting alloys. Steel actually shrinks about 3 per cent during solidification, but 5 per cent is probably a realistic figure because allowance must be made for liquid contraction, too. Malleable cast iron and white cast iron solidify with a volumetric shrinkage of about 5½ per cent. Gray cast iron includes a whole family of alloys. Saeger and Ash (*Transactions*, AFS, 1932) ascertained the relation of shrinkage in cast iron to the per cent of graphitic carbon present in the alloy as solidified.

The vital effect of graphite on the shrinkage of cast iron is not commonly appreciated. Nearly all substances except a few such as water are more dense in solid than in liquid form and therefore contract during solidification. Gray cast iron is unique in that during its solidification, graphite concurrently precipitates from solution in the iron.

We know from the example of dissolving sugar in a cup of coffee that the volume of a solution is not as great as the sum of the volumes of the ingredients. In a reverse reaction, therefore, an expansion results when graphite is precipitated from liquid iron. If there is enough graphite present, the entire contraction during solidification can be absorbed by the precipitation. Saeger and Ash show that this is virtually true in cast iron containing over 3 per cent graphitic carbon. It is well known that high-carbon gray iron poured into a dry sand mold does not shrink.

It should be emphasized that these shrinkage figures have no relation to patternmakers' shrinkage and should not be confused with them. As previously stated, this function is an entirely different one. The figures on volumetric contraction pertain to the metal itself and are generally applicable to dry sand or oil core sand molds. Care must be exercised when the castings are poured in green sand molds.

Recent technical papers have demonstrated adequately that green molding sand may have a decided influence on casting shrinkage. The apparent effect is that the sand contracts or withdraws from the casting surface as heat is conducted into it, thus enlarging the mold cavity. If the sprue freezes off rapidly, this effect puts an added drain on the riser and results in a slightly larger and heavier casting.

The shape of a riser is just as important as its size, and a round riser is preferable for more than one reason. The volume-surface ratio of a cylinder is higher than those of a square, a rectangle or an oval. The higher the ratio, the slower the cooling rate. In addition, the arched surface of a round riser is less subject to sand and molding defects.

The most common reasons for the use of other than

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Fig. 11—Williams riser (top) uses core to introduce atmospheric pressure to center of the riser

round risers are the availability of square pieces of woods for riser patterns and lack of space between bars of cope flasks. It should be remembered, however, that such surrenders to expediency require the sacrifice of either metal yield or safety factor in the riser.

Risers may be classified into two types—side risers and top risers—according to how they are applied to castings. Top risers generally follow the geometry of an inverted T, as shown in the top center illustration in Fig. 9. Regardless of how thick or thin the top leg section is made, the hottest point will be at the junction of the two members. For that reason, and to facilitate riser removal, a top riser must have a necked-down portion where it is attached (special techniques such as pumping or hot-topping excepted).

The object of this neck is to draw up the hot spot of the section entirely into the riser. If the neck is tapered over too long a section, the riser will freeze off in the neck before it can do a satisfactory job of feeding the casting, as illustrated in Fig. 9, on the right. Conversely, if the neck is too short and sharp, a hot spot can develop in the projections of sand in the neck at the casting.

These thin projections can aggravate the hot spot condition at the junction of riser and casting, making this point the last to solidify, regardless of the adequacy of the size of the riser above it. Although several practical methods have been developed for determining a satisfactory riser neck shape, the foundry industry is definitely in need of a fundamental study to establish the ideal shape.

One satisfactory method of forming a riser neck is to start at a height one-half the diameter of the riser above the casting and to reduce the diameter through a smooth S curve to a minimum of two-thirds of the full size at the casting. A breakoff pad should be provided at the casting surface to avoid breaking in during removal of the riser.

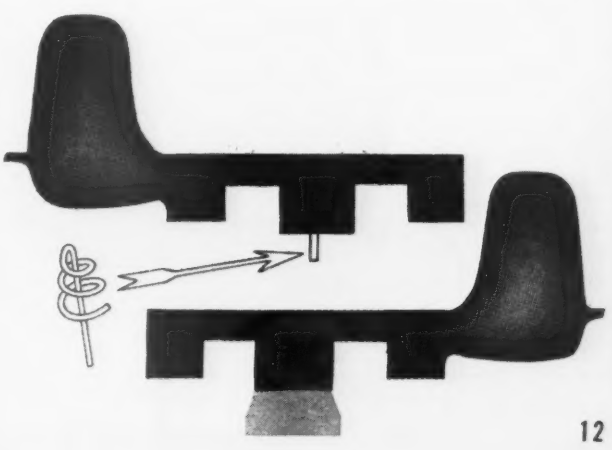
Side risers constitute the second general classification of riser shapes. The L-shaped cross section with its re-entrant angle is shown in the lower left corner of Fig. 10. Its shape makes this type of riser tend naturally to have the hottest spot within the bowl of the riser. As a result, limitations of the shapes of side risers are not as critical as those of top risers. Bowl and neck must be sufficiently large; it is not likely that they could normally be made too large. Caution is necessary, however, when a side riser is attached to a casting which extends up into the cope. If the neck is made too short in such an instance, the hot spot in the riser system will again be at the junction of the casting. Good thermal distribution is shown in the center view of Fig. 10.

A side riser is of advantage in that it can be gated through conveniently, a condition highly desirable to the promotion of directional solidification. Another advantage of the side riser in jobbing work is that the bowl pattern must be laid in the flask before the drag is rammed up. This fact compels the molder to think about his gating and risering system before half of the mold is rammed. Molders frequently ram up the drag before they consider the gates and risers, then cannot place them where they would most desire to because of lack of space or of planning when the pattern was laid in the flask.

The shrink bob or blind riser is a special type of side riser, so called because it does not cut through the cope surface. It is used to advantage in lighter work. The absence of an opening through the cope avoids the possibility of knocking loose sand into the mold when weights or jackets are shifted. The heavy draft on a shrink bob puts its largest cross section at the parting line, where it is most needed. The blind riser does a fair job of relieving strain in a mold by taking the flow of metal as it fills up in the last portion of the pouring time. It does not indicate when the mold is full, but a sprue or whistler can be added to do that job.

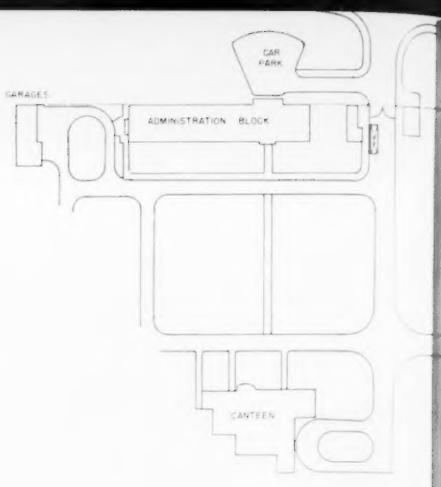
A special type of riser which has become popular in recent years is the (*Please turn to page* 244)

Fig. 12—Examples of internal and external chills



12

By VINCENT DELPORT
European Manager
FOUNDRY



NEW ROLL FOUNDRY

Completed in Great Britain

FROM the time of earliest known records of the process of shaping metals by rolling, the British foundry industry has done pioneer work in the making of rolls and has maintained its prominent position in that field. Numerous early seventeenth century references can be found to the rolling of lead, lead-tin alloys and precious metals. Later, experience, combined with close observation and inventiveness, led to the discovery of how to roll less ductile metals.

Today, few metals are not capable of deformation by rolling. Although the preparation of the molds for roll castings still demands a high degree of craftmanship, metallurgical research has placed at the disposal of the rollmaker a range of iron and steel alloys which go into the making of rolls for a wide variety of purposes.

Owing to the proximity of high-grade coal and iron ore, South Staffordshire became the early home of the iron industry in England and, back in early days of the Industrial Revolution, the first iron founders who specialized in roll manufacture concentrated in that area. However, the rapid expansion of the iron, steel and nonferrous industries necessitated expansion to other parts of the country, where a number of rollmaking firms grew up, progressed and prospered.

In recent years, rapid developments made by the rolling mill industry, culminating in the design and performance of the modern strip mill, stimulated intensive research in the field of rollmaking.

A few years ago, certain progressive rollmakers realized that only by pooling their resources could they afford the expenditure necessary to make their respective plants capable of meeting the demands occasioned by world developments. This realization led to the formation of the British Rollmakers Corp. in December, 1942.

Initially, this corporation was the outcome of a fusion of three long established roll foundries: R. B. Tennent Ltd., C. Akrill Ltd. and Thomas Perry Ltd. In 1944, the corporation acquired the roll businesses of Bayliss, Jones & Bayliss Ltd. and John Lysaght Ltd., both on rather limited sites at Wolverhampton. Later, these two companies were merged into one, Bayliss Rolls Ltd.

This opportunity was seized to build a new works on an unrestricted site at Crewe, between Manchester and Birmingham. By 1947, a subsidiary company of the British Rollmakers' Corp. had been formed as Midland Rollmakers Ltd. to control and co-ordinate the modernized works of the Midlands companies of C. Akrill Ltd. at West Bromwich, Thomas Perry

Fig. 4—View of the main molding bay

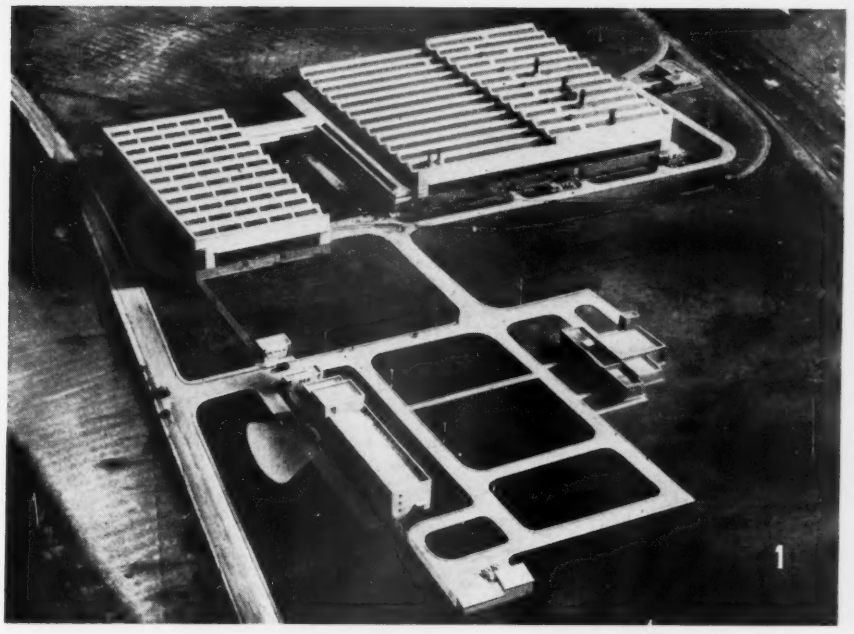


Fig. 1—Aerial view of new iron roll foundry, machine shop and office of Bayliss Rolls Ltd. at Crewe, England

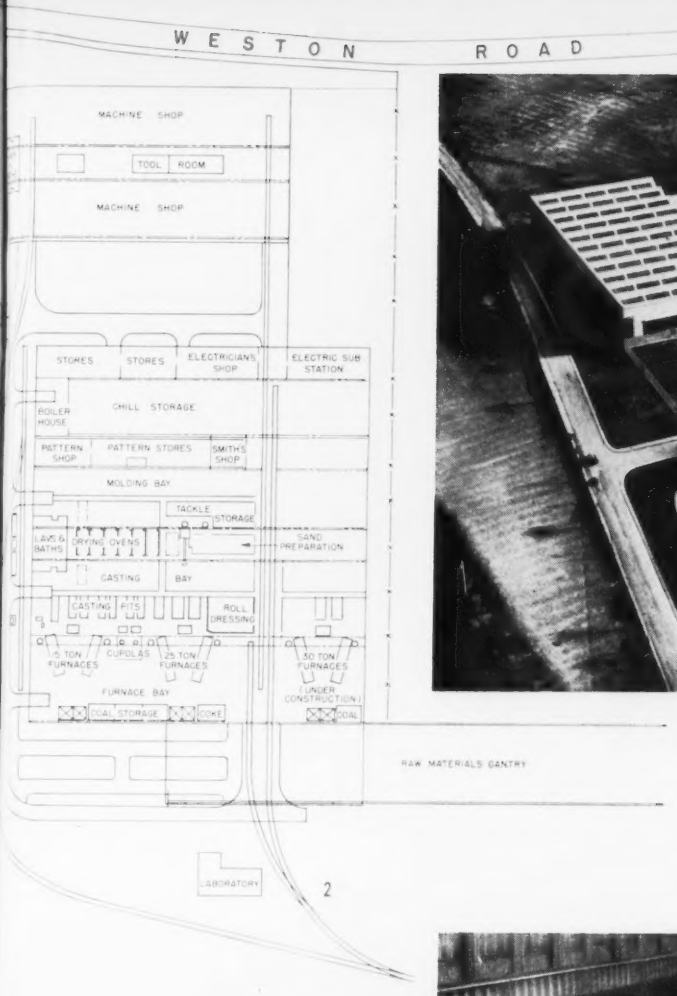


Fig. 2—Layout of the plant, showing location of various departments

Fig. 3—Raw materials storage bins at left. Air furnaces shown at right

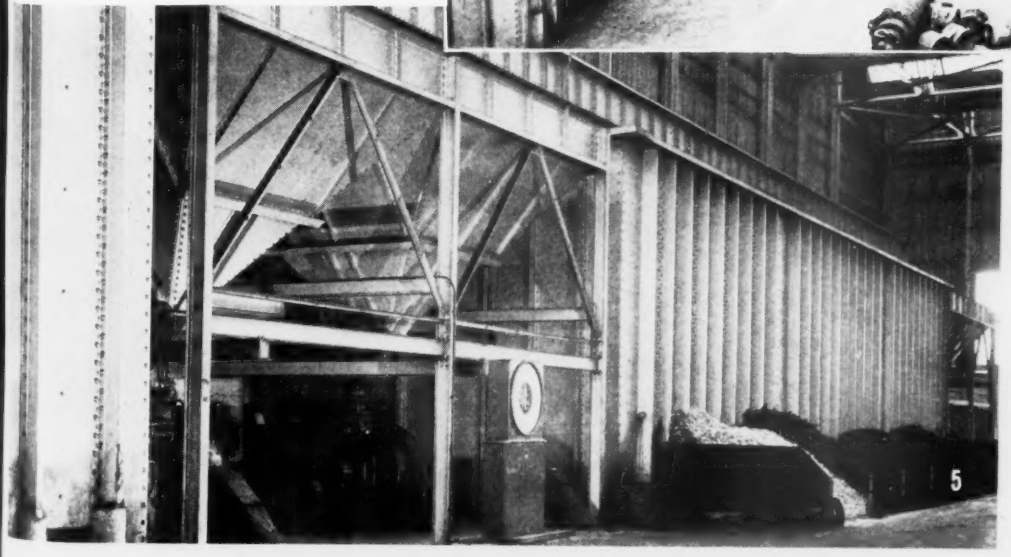


Fig. 5—Close-up view of the raw materials storage department

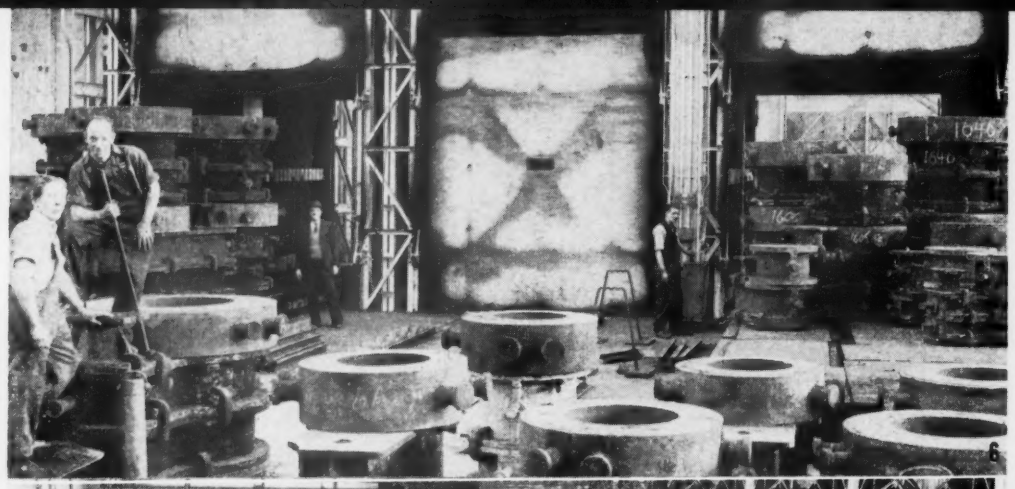


Fig. 6—The molds are dried in six oil-fired recirculating ovens

Fig. 7—Bay where the castings are cleaned

Fig. 8—Bay devoted to chill, tackle storage

Fig. 9 — Machine shop is located in a separate building located adjoining the foundry

Fig. 10—Pouring scene in the Crewe foundry. Rolls are cast in iron molds and also in loam swept molds

Fig. 11—Type of wagon used to handle heavy rolls. The plant also is equipped with a number of overhead cranes

Ltd. at Bilston, and Bayliss Rolls Ltd.

Bayliss Rolls Ltd. now operates at the new works at Crewe, where only cast iron rolls are made, the production of steel rolls being concentrated at the works of R. B. Tennent Ltd. in Scotland.

The main object of the planning and designing of the new foundry at Crewe was to create a plant with maximum spaciousness, the best methods of lighting and ventilation, and latest facilities for promoting the moral and physical well-being of the workers and with plenty of space available in all directions for future extension. Thanks to many months of intensive study on the part of executives, engineers and management, the goal has been achieved, and the Crewe roll foundry is probably today as advanced in design and layout as any other in the world.

During the layout of this foundry, which will eventually make castings beyond 20 tons in weight, attention was concentrated on facilities for routing and handling heavy loads, from raw materials storage through the various stages of manufacture and machining, down to the storage bay and the loading platform.

The site of the new works is a 70-acre strip of land within ten minutes walk of Crewe station. It is bounded by the main railroad, with which the works are directly connected, on the southwest, and by a road on the northeast. Work on the site commenced in March, 1948, and production actually started in May, 1951, and was built up to reach the capacity of the plant then installed by December, 1951.

The main entrance and offices are on Western Road. The general layout provides for administration and commercial offices, technical and research buildings, a canteen, a medical and welfare center, recreation grounds and social amenities on the right or north side of the main works' entrance. The works laboratory, foundry and machine shop are on the left or south side of the entrance. The main railroad line connects with adequate sidings and with the various departments. Concrete and blacktop roads also serve all parts of the individual buildings of the plant.

The foundry building consists of four main bays, two of 80 ft and two of 60 ft span, and two intermediate bays, of 40 ft span. The overall length is 360 feet. While a roll foundry obviously cannot be mechanized in the usual sense of the word, provision has been made for the rapid movement of the heavy loads involved by adequate overhead cranes, and all bays are connected by an electric-powered truck on which loads of up to 40 tons may be transported at 200 fpm.

Six overhead electric traveling cranes are now in operation, and additional cranes up to 80-ton capacity will be provided. There are also a number of fixed cranes installed at suitable positions which are capable of revolving around a complete circle.

The building houses the following departments: Raw materials storage; melting units; ladle and casting pits; stripping and cleaning area; sand preparation; drying stoves; molding area; pattern shop and stores; forge; tackle storage; boiler house; electric power and switch house; maintenance engineers and electrician's shop; general stores. The layout of the various departments was planned to insure logical routing of materials and products.

The melting units include four top-charged air furnaces, two of 15 tons capacity and two of 25 tons. Two more furnaces of 30 tons capacity are under construction. The roofs are lifted by overhead crane for charging, and the charges are dropped by overhead crane also. These furnaces are fired by pulverized fuel from indepedendent (*Please turn to page* 246)

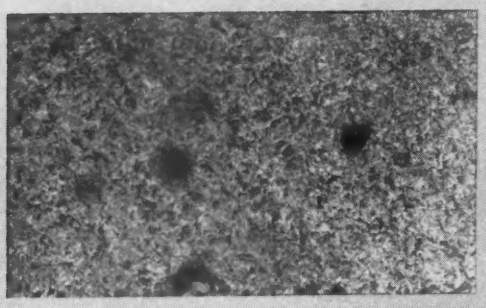


Fig. 1—Enlarged (8X) view of casting surface shows pits caused by boric acid presence in molding sand

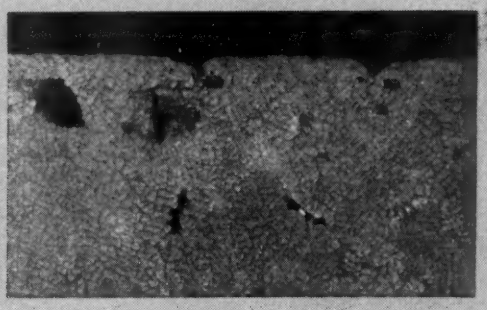


Fig. 2—Cross-sectional view of casting reveals surface gas porosity resulting from boric acid

A Cause of SURFACE POROSITY in 7 Per Cent SILICON ALUMINUM CASTINGS

Boric acid in molding sand can cause surface porosity in casting 7 per cent silicon aluminum. The author's studies show this condition begins to appear at an acid concentration of about 0.06 per cent. When concentration reaches 0.10 per cent, the surface porosity condition is severe

SURFACE porosity in 7 per cent silicon aluminum alloy (Alcoa 356) is sometimes the result of boric acid pickup in the aluminum molding sand of foundries which produce both aluminum and magnesium alloy castings in the same building. Fig. 3 illustrates this condition which occurred when boric acid contamination reached 0.12 per cent in the molding sand system.

This type of surface porosity is caused by the volatilization of boric acid crystals giving off steam and boron trioxide gas on prolonged contact with heavy cast sections. The individual bursts of boron trioxide and steam penetrate the skin of the slowly solidifying heavy sections. After shakeout, the casting will show many small bright spots on its otherwise dull surface. These spots or skins will disappear under sand blasting, revealing pits or gas holes penetrating as deeply as 1/16-in. below the casting surface, as shown in the enlarged (8X) photographs of the casting surface and cross sectional view of surface gas porosity in Figs. 1 and 2.

There are three principal sources of boric acid contamination of aluminum molding sand in the modern, mechanized Sperry Gyroscope Co. foundry at Lake Success, N. Y., where 19 different aluminum, copper and magnesium alloys are all cast in one building. These sources are (1) boron trioxide-bearing fumes from the pouring floor which recrystallize to boric acid in the air and are absorbed by the reconditioned molding sand traveling on the overhead conveyor of the sand distribution system; (2) magnesium molding sand sometimes clings to the inside of flasks when they are transferred from use on magnesium jobs to use on aluminum cast work; (3) occasionally, a magnesium casting may be shaken out on the aluminum shakeout floor, thus introducing boric acid into the aluminum system sand directly. As little as 1 pound of boric acid per ton of sand may cause surface porosity.

The method used for determining the percentage of boric acid in the aluminum molding sand is the titration of boric acid with standard sodium hydroxide in the presence of mannitol or glycerol. The sand samples used are accumulated daily from the sand system and mixed for one weekly control analysis.

In order to create this surface porosity artificially and verify its cause, several batches of synthetic molding sand, composed of grade "E" washed silica sand, 6 per cent bentonite, and 4 per cent moisture were mixed for tests. To these batches were added increasing percentages of boric acid. Test blocks

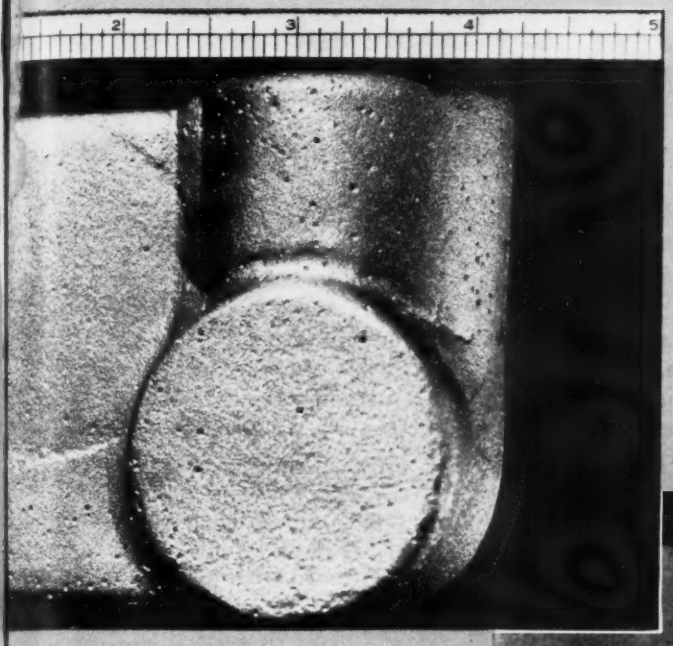


Fig. 3 (left)—This type of surface porosity is caused by the volatilization of boric acid crystals giving off steam and boron trioxide gas on long contact with heavy cast sections

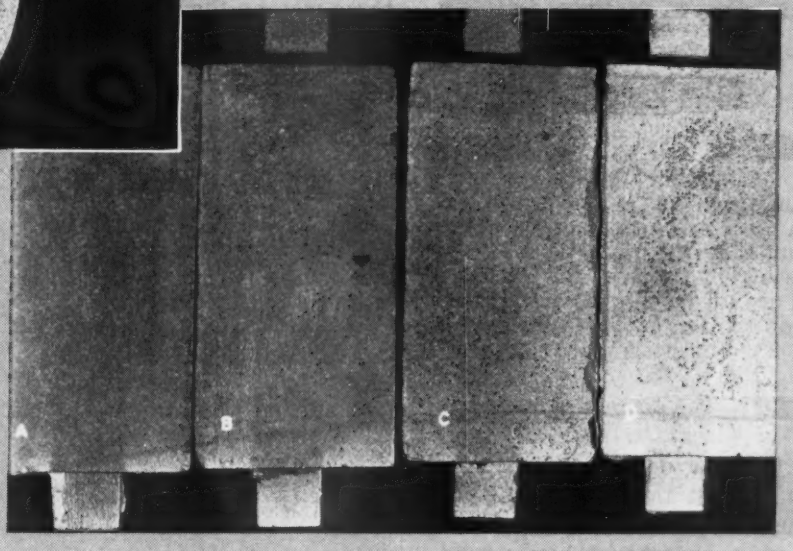


Fig. 4 (below)—Showing how surface porosity increases as boric acid percentage increases. Boric acid percentages are given in Table I

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3 x 3 x 6 in., were cast at 1400° F from the same heat of aluminum. The resulting castings exhibited progressively increasing amounts of surface porosity at boric acid concentrations of 0.10 per cent or more. Table I shows the test data.

Fig. 4 shows the increasing amount of surface porosity as the percentage of boric acid was increased.

Table II is the record of aluminum molding sand contamination control data over a period of nine months. As will be observed, surface porosity begins to appear at a boric acid concentration of about 0.06 per cent and reaches a prohibitive condition at 0.10 per cent.

The best plan to follow to avoid boric acid contamination of aluminum molding sand is to cast the magnesium in a separate building. When this is not feasible, it is desirable to analyze the aluminum molding sand weekly and cut it sufficiently with new sand to maintain the contaminant at a safe level, rejecting the sand removed from the heap. Where these procedures cannot be followed, surface porosity may be avoided by facing all heavy sections of aluminum castings with newly mixed, unadulterated sand and backing this up with the necessary amount of contaminated heap sand.

TABLE I—Effect of Boric Acid Additions

Sample	Boric Acid (%)	Remarks
A	0.0	Control—no porosity
B	0.10	Severe surface porosity
C	0.5	Very severe surface porosity
D	1.0	Very severe surface porosity

TABLE II—Record of Sand Contamination

Date Sampled	Per cent H_3BO_3	Remarks
11-13-51	0.10	Severe surface porosity in castings
11-26-51	0.00	Replaced all molding sand—no porosity
12-3-51	0.00	No surface porosity
12-10-51	0.015	No surface porosity
12-17-51	0.007	No surface porosity
12-28-51	0.010	No surface porosity
1-7-52	0.034	No surface porosity
1-17-52	0.05	No surface porosity
1-23-52	0.04	No surface porosity
1-31-52	0.06	Slight surface porosity in castings
2-12-52	0.06	Slight surface porosity in castings
2-16-52	0.07	Slight surface porosity in castings
2-18-52	0.07	Slight surface porosity in castings
2-25-52	0.08	Medium surface porosity in castings
2-29-52	0.07	Medium surface porosity in castings
3-7-52	0.10	Severe surface porosity in castings
3-19-52	0.06	Replaced part of sand in system
3-24-52	0.06	daily from 3-19 to 4-25-52.
4-1-52	0.06	
4-9-52	0.03	
4-18-52	0.06	
4-23-52	0.07	Slight surface porosity in castings
5-5-52	0.07	Slight surface porosity in castings
5-12-52	0.05	Slight surface porosity in castings
5-19-52	0.05	Slight surface porosity in castings
5-23-52	0.05	Slight surface porosity in castings
6-2-52	0.07	Medium surface porosity in castings
6-16-52	0.08	Medium surface porosity in castings
7-3-52	0.09	Medium surface porosity in castings
7-9-52	0.09	Medium surface porosity in castings
7-17-52	0.11	Severe surface porosity in castings
7-21-52	0.12	Severe surface porosity in castings
7-28-52	0.08	Replaced one-half of molding sand
8-19-52	0.07	between 7-21 and 8-19-52
8-21-52	0.06	Slight surface porosity in castings

QUESTIONS

Cover riser opening . . . . . Increases production

No average loss figures for defective castings . . . . . .

Pattern arrangement . . . . Experience is needed

Paper Covers Riser Opening

QUESTION In our foundry we have had considerable debate on what advantage, if any, there is in placing a piece of paper over the riser. In our case the riser generally is made higher by means of an extra head or box and the paper is placed on top of the mold to cover the hole, and the head placed over it.

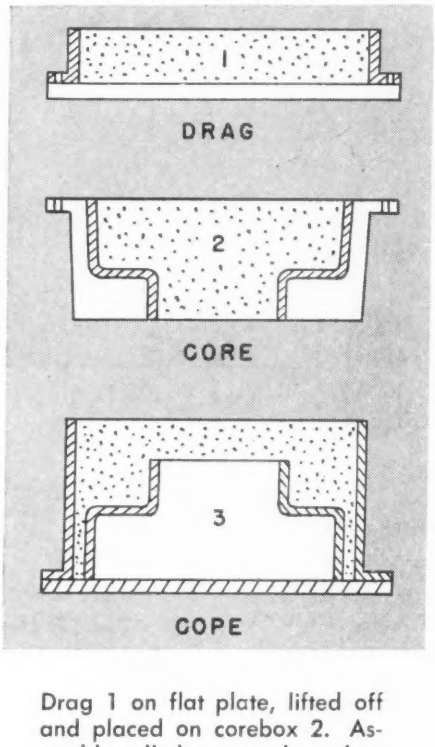
ANSWER The one and only advantage of placing a piece of paper over the riser or the sprue opening is to prevent the entrance of dirt or dust into the mold cavity.

In your case where a box or header is set in place after the mold is made, the precaution of placing a piece of paper over the hole is practically a "must" since usually some of the sand on top of the mold or on the bottom of the box being put in position, is disturbed, and easily could fall into the mold cavity—resulting in one of those "mysterious" foundry happenings of how the dirt got into the mold.

Pattern Increases Production

QUESTION In the production of gray iron flush-tank castings we are seriously handicapped by lack of skilled help. With molds made on the floor the average daily production per man of 21 and 30 lb castings, $\frac{1}{8}$ and $\frac{3}{16}$ in. thick, is 25. We use aluminum plated patterns. We shall appreciate any suggestion on how to increase production without mechanization.

ANSWER How to increase production of these castings without skilled men and without installation of mechanical equipment presents quite a problem. Assuming that the entire mold at present is made by one man in the usual manner, core left standing on drag, and entire mold formed in deep cope, we might suggest changing to three-part patterns, and putting three men on the job—one man on drags, one man on cores and one man on copes. None of these men requires the skill and experience of a single man who makes the entire mold.



Drag 1 on flat plate, lifted off and placed on corebox 2. Assembly rolled over and corebox removed. Cope 3 is lifted off and closed down over core. Spikes anchor core

In the sequence of operation as shown in the accompanying sketch (not drawn exactly to shape or scale), the first man rams a shallow flat drag, or nowel as it is known in your country. He lifts it from the plate and places it on the pattern containing the core, which has been rammed by the second man. The two parts are clamped, rolled over and placed on the floor or on a conveyor line. The third man lifts the cope from his pattern and closes the mold. In a two-man team, one man rams core and drag as a unit and rolls them over. The second man handles the cope as in the first instance. Obviously, flasks and pattern rigging must be fitted and maintained with greatest accuracy.

Defective Loss Figures Vary

QUESTION Have you any information available which would serve as a guide in ascertaining what the percentage of foundry scrap and foundry rejects should run in a well supervised operation at current levels? We melt about 25 tons daily with better than 90 per cent machine molding and good handling equipment, but we do not have automatic sand conditioning. Our work principally is jobbing with orders running from 100 to 1000 pieces for the most part. From your own observations what would be considered an allowable range for foundry scrap and customers' rejects?

ANSWER It should be pointed out that so many factors are involved that each foundry has to develop its own idea as to what constitutes the most favorable figure and then try to improve on that. In other words, a foundry with good control in melting, molding, etc., making large numbers of the same castings day in and day out should have less defective castings than one producing small lots of a variety of castings, or one lacking good control.

Some time ago we ran across some figures, but do not recall the source. They are as follows:

A large electrical manufacturer shows a total loss in iron castings from all sources of 7.2 per cent of the value which was distributed 3.8 per cent after final inspection and 3.4 per cent to machine rejects. No figure is given on defects before

? ANSWERS

cleaning. An automobile manufacturer shows a total loss from all sources of 5.4 per cent which was distributed as 0.8 per cent before cleaning, 3.3 per cent after final inspection, and 1.3 per cent machine shop rejects. Approximate quantity of castings machined was 146,321 net, which would indicate that the figures relate to the number of castings involved.

It would appear to us that by maintaining a check on the causes of scrap castings by someone competent to judge, you may be able to reduce the number by making suitable changes to remedy the situation. For example, if major losses were due to sand, it would indicate that a study of the sand and its conditioning would be well worth while.

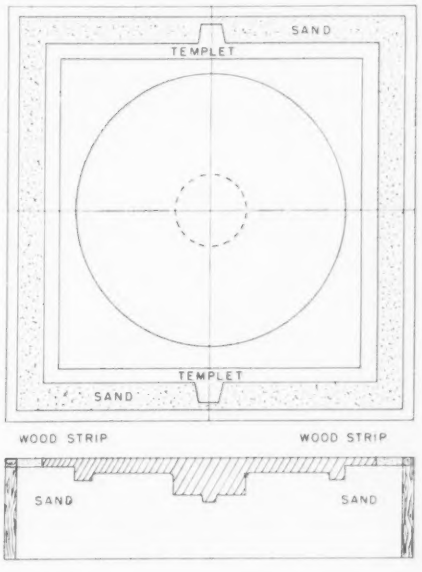
May Be Either Shrink or Blow

QUESTION We are enclosing sketch of a cast iron sprocket wheel 10¼ in. diam, 3 in. hub, ¾-in. bore, ¼-in. web and ½-in. face. We have had shrinkage in the hubs of many castings molded from loose patterns. We intend to mount the pattern, split through the center, on a plate, but are undecided on a proper gating system. We shall appreciate your comment on pattern construction, also style, size and position of gates.

ANSWER Two methods are available for mounting the pattern. In the first, one-half of the existing pattern is molded and cast. The casting is attached with bolts or screws to a flat steel, cast iron, brass or aluminum plate. Great care must be exercised in attaching the half pattern to the exact center of the plate.

With a symmetrical pattern, the copes and drags of the molds are made from the same half pattern. Hence the necessity of centering the pattern on the plate so that cope and drag mold impressions will coincide when each mold is closed. Principal advantage of the method is that, if necessary, the half pattern may be hand finished before it is attached to the plate.

In the second method—the more popular of the two, and applicable in the present instance—plate and pattern are cast as a unit. One-half of the original split wood pattern is molded in the usual manner,



Drag as it appears before removal of half split pattern and templet

except that the flask must be larger to accommodate the plate. The cope is rammed and lifted off. Wood strips the thickness of the anticipated plate are laid or tacked to the joint of the drag. A light wood frame or templet, with a pin lug at each end, is placed on the joint in such a manner that the half wood pattern is in the exact center.

Space between the outside of the templet and the inside of the wood strips on the joint is filled with packed sand. Surplus sand is removed to form a flat new support for the cope. Templet and half wheel pattern are removed and the mold is closed and filled with metal, usually an aluminum alloy. The mold may be gated at the end, the side or on top. This is not an important feature. The same comment applies to a gating system to use on the new plated pattern. Practically unanimous opinion favors a sprue on top of the hub. It is simple. It is efficient. It requires the minimum amount of metal.

Finally, we are of the opinion that the defect you label a shrink in the hub, really is a blow—a gas pocket—caused by a defective or ill vented center core.

Can't Melt Brass in Iron Pot

QUESTION In our small home workshop we have made a considerable number of aluminum castings. Now we have been offered the opportunity of making a number of 7-lb brass castings in metal molds. We have had no experience with brass foundry or die cast practice, and will appreciate advice on the following points: 1—Can we melt brass with coal? 2—Is a crucible the only ladle in which brass may be melted? 3—Is it necessary to heat the die before pouring the metal into it? 4—Could we use a small ladle to dip the brass from the furnace ladle? 5—In die casting practice is the metal poured fast or slow?

ANSWER We are all heartily in favor of individual enterprise, but we regret that in the present instance we are inclined to the opinion that you are not in position to handle the brass die casting job. First, because you are not familiar with brass foundry practice, and second you would need too much equipment—unless, of course, the job is a long running one, sufficient to absorb the cost of the equipment.

You would need a furnace and a crucible and that means a succession of crucibles. The life is limited. The furnace needs a high stack to create sufficient draft with either anthracite coal or coke.

QUESTIONS ? ANSWERS

A much lower stack will serve if oil or gas is used for fuel. Auxiliary equipment in the form of a pump and blower is needed with gas or oil. Brass also is melted in electric furnaces, in open flame and reverberatory furnaces, but for the volume of castings you have in mind the cost probably would be prohibitive.

Taking up your questions in order of presentation, the following brief answers may serve your purpose. Where anthracite coal is available, some foundrymen use this fuel around a crucible in a refractory-lined pit type furnace. In an emergency brass has been melted in a crucible bedded in a blacksmith forge fire. The soft coal fire is deeper than usual and is supplemented by short pieces of wood around and over the top of the crucible, which is covered. When the metal is melted the crucible is lifted out of the fire, set in the usual type shank and carried to the foundry floor where the metal is poured into the mold, or molds.

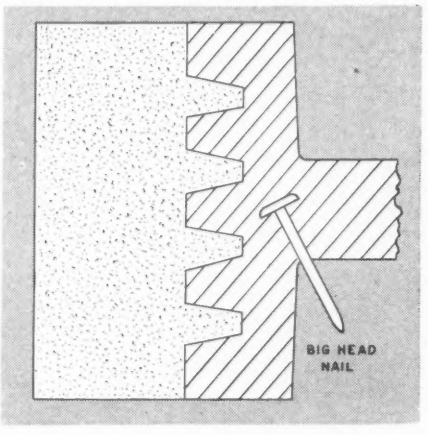
If you had about 25 dies or molds, you could melt 250 lb in a No. 80 crucible and fill all the molds from one heat. If you had only one mold the job would be impracticable. Brass and bronze have a considerably higher melting point than aluminum and cannot be melted, dipped or manipulated in an unlined metal ladle. Dies or molds must be heated before metal is poured into them. Usually that means only the first time the die is used each day. Subsequent casts keep the die at the proper temperature. One of the main reasons for heating the die is to expel any trace of moisture. A cold die has a tendency to be damp. Moisture or dampness converted into steam is highly explosive.

Speed at which the metal is poured into the mold is a form of knowledge gained only through experience. Obviously a mold with thin areas must be filled more rapidly than a mold in which the sections are thick. When the pouring speed is too slow, the casting will show splits, cold shuts and pockets.

Porosity in a Grooved Sheave

QUESTION From time to time we have made a number of V-belt sheaves and have had considerable trouble with spongy spots at the bottom of the belt grooves over each of the spokes in the wheel. We have tried placing risers on the rim over each spoke. We have placed chills just beneath the belt grooves at the spoke ends. We have gated the castings on the rim, also on the hub, but on the average about half the castings are rejected when partly machined. Our present problem is a casting with a rim, 5-in. face and 1½-in. thick in the rough.

ANSWER The problem of how to prevent shrinkage or porosity in the roots of cut gear teeth and in the bottom of the grooves machined in pulley or sheave faces has plagued foundrymen for many years. Sometimes the defect is cured by a change in the metal, sometimes by a change in the gating system, sometimes by mold manipulation, and sometimes by a combination of two or more of the foregoing factors.



Projections on dry sand rim core equalize the section thickness

In some instances instead of a definite shrink, the iron has a coarse structure. The composition is not suitable for the section thickness. A high-silicon iron suitable for a thin section will show a coarse open grain in a heavy section, due to slow cooling. In a case of that kind it is advisable to change the cupola mixture to obtain a lower silicon content by increasing the amount of scrap, or by adding some steel to the cupola charge.

The third preventive of shrinkage or porosity referred to above is the best, and is shown in the accompanying illustration. A core print is attached to the face of the pattern rim. A corebox is constructed, 1/2, 1/3, 1/4,, 1/6 or 1/8 of circle, depending on the diameter of the casting. Projections to form the sand grooves are smaller by approximately ¼-in. than the anticipated metal grooves in the casting. Obviously, with the core members projecting into the mold cavity, the metal thickness will be reduced and will be fairly uniform. There will be no hot spots or porous areas when the operator of the lathe or boring mill sinks a cutter into the various grooves. As an added precaution, in some instances it may be advisable to insert two or three large-head nails, as shown in the sketch, to serve as internal chills.

Grinding Wheel Speed Ranges

QUESTION We would appreciate an answer to the question about the comparison in capacity of a resin-bonded grinding disk with a corundum grinding disk. Our resin-bonded disks have a speed of 45 meters per second (8856 sfm) and the corundum disks 25 meters per second (4920 sfm)

ANSWER In this country the peripheral operating speeds for resin-bonded grinding wheels are from 7000 to 9500 surface feet per minute, and for vitrified-bonded wheels from 5000 to 6000 sfm. Hence, your resin-bonded wheels are near the top of the speed range while the vitrified - bonded wheels are operating on the lower edge, and probably could be increased to the middle of the range with advantage.

Resin-bonded wheels of the proper grain size and structure usually have higher metal removal rate due to their higher speed of operation,

(*Concluded on page* 118)

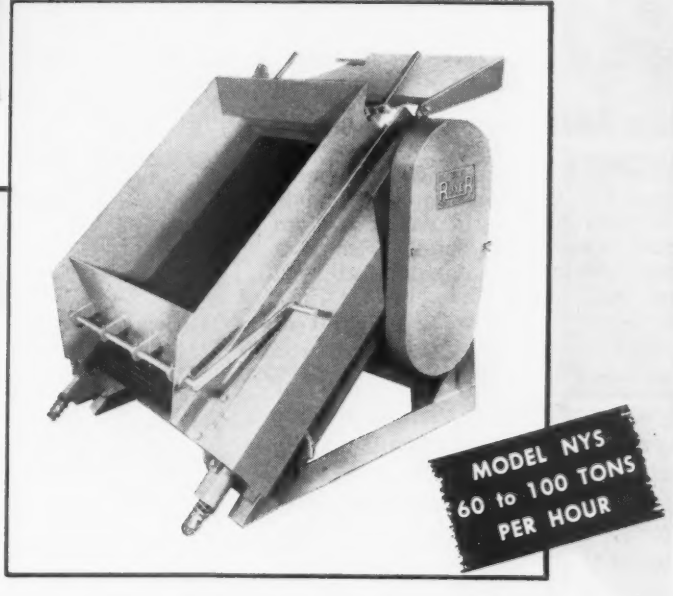
Sand Conditioning

for medium to large foundries

MODEL NDP
20 to 25 TONS
PER HOUR

MODEL NRS
40 to 50 TONS
PER HOUR

A ROYER CAN SUPPLY THE TONNAGES YOU REQUIRE



MODEL NYS
60 to 100 TONS
PER HOUR

A Royer Sand Separator and Blender provides rapid, efficient sand preparation, in tonnages to meet most any requirement. More than 8,000 of these cost-cutting units are at work in foundries, conditioning molding sand for jobbing and production work.

Sand is fed into the hopper and the "combing belt" action does the rest . . . rapidly and automatically. Conditioned sand is discharged after being thoroughly mixed, blended and aerated, with all trash removed.

In addition to the saving in labor costs over slow, time consuming manual preparation, this properly conditioned sand aids in securing many additional economies. New sand requirements are lowered . . . the smoother surfaced castings require less machining and grinding . . . rejects due to scabs, skids and runouts are greatly reduced.

More than half of the Royer users have purchased additional units . . . real proof of their profitable and efficient performance. Send for bulletin giving information on all models in capacities from 4 to 100 tons per hour.

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Foremost in Sand ROYER *Conditioning Equipment*

ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

QUESTIONS ? ANSWERS

(*Concluded from page* 116)

but time of contact between work and wheel has an important bearing on the results.

Best method to ascertain which type of wheel is most economical for your foundry is to run some experimental tests. One procedure would be to weigh the wheel before and after the test run to determine the amount of abrasive used. Similarly the castings would be weighed before and after grinding to determine the amount of metal removed. Total elapsed time for the operation as well as contact time between work and wheel also should be recorded.

Base Allowance on Experience

QUESTION We would like to know what the following molding sands are used for: Light sand, medium sand, and heavy sand. Also how much shrinkage should be allowed per ft in diam for a bronze liner casting 6 ft OD with a height of 2 ft?

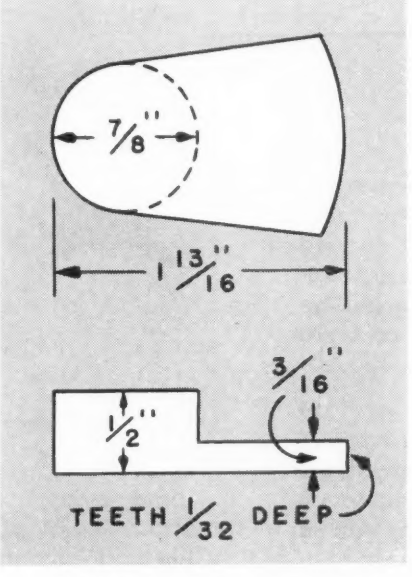
ANSWER The terminology or grading of light, medium and heavy as applied to molding sands usually refers to section thickness of casting which can be produced satisfactorily. Characteristics and properties of the sands also will vary with the kind of metal being poured, owing in general to the temperatures involved and their effect in gas or steam formation. In other words, a molding sand suitable for making heavy aluminum alloy castings will not be the same as one for heavy gray iron castings.

While the shrinkage contraction or patternmaker's shrinkage for bronze is given as $\frac{1}{8}$ to $\frac{3}{16}$-in. per ft, the actual amount has to be based on practical experience in a given foundry since it will vary with such factors as green or dry sand, hardness of ramming, care with which the pattern is drawn, etc. Without the necessary background of experience, we believe it would be advisable for you to provide the maximum shrinkage allowance; then, after the casting is made, make measurements to ascertain whether or not the casting "came in" the amount allowed.

Aluminum Bronze Is Too Hard

QUESTION We are enclosing for your attention a small aluminum bronze casting which cannot be machined. It is part of two lots of castings showing the same analysis—83.09 per cent Cu, 4.75 per cent Fe, 10.94 per cent Al and 1.08 per cent Mn. Both lots were heat treated by an outside concern, and presumably heat treatment was the same, but one lot was readily machinable and the other unmachinable.

ANSWER Simple file test of the specimen submitted indicates that



Small aluminum bronze casting is too hard to permit machining

it is quite hard. Assuming that the composition of this piece was the same as that for pieces readily machinable, the only answer would be a difference in heat treatment. Presumably the castings are heated 1350° F or possibly higher, then quenched, and reheated to 930 to 1200°. Possibly with the second or hard lot, the reheating or drawing operation was forgotten.

Our suggestion would be to heat the hard pieces to a red heat and let them air cool slowly. Then try machining or a file. That, of course, is just a rough test to determine what might have occurred. In commercial practice we believe it advisable to standardize on definite temperature ranges for heating prior to quenching, as well as holding time at temperature, and for reheat or drawing. Also it might be well to specify the quenching medium and temperature.

All of this would be tied in with machining tests and desired physical properties. Once established, a check probably could be maintained by use of some type of hardness test—brinell, Rockwell, etc.

Using Plastics for Patterns

QUESTION We are interested in the possible use of plastics for multiple patterns used in split pattern molding of small castings such as pipe fittings. Can you supply us with information concerning actual results which have been obtained including relative cost, abrasion resistance and general suitability, etc.?

ANSWER So far as we know, plastic patterns are being used successfully by a number of foundries. Articles relating to making such patterns published in FOUNDRY include "Casting Patterns in Phenolic Resins," February, 1946; "Matchplate Patterns from Phenolic Casting Resin," November, 1946; "Plastic Patterns," July, 1947; "Plastic Patterns Made by New Process," February, 1948, and "Matchplates Made from Plastic," August, 1948.

Plastic patterns are made in plaster molds and have a very smooth surface which requires little if any, finishing. It is claimed that they can be made more rapidly than in metal. Material is quite sturdy and withstands foundry usage. If struck with a glancing blow it may chip, but can be repaired easily with the same material in liquid form.

If the material covers any extensive area—matchplate for example—it must be reinforced in some manner since it is brittle. More details on suitable resins or plastics and methods of making patterns and matchplates of the materials may be secured from the various resin producers whose names and addresses appear in the advertising pages of FOUNDRY.

42 FURNACES OVER A MILLION TONS...

and still going strong with

NATIONAL CARBON

TRADE-MARK

BLAST FURNACE LININGS

Of these 42 "National" carbon-lined blast furnaces, 13 original linings have produced from 1 to 1½ million tons; 18 from 1½ to 2 millions; 10 have produced between 2 and 2½ millions; and 1 lining has topped the 2½ million ton mark. Every year more "National" carbon goes in . . . *stays* in to produce record tonnages, record low cost and *smooth* operation. More and more, it pays to watch the growth of CARBON in modern steel-making equipment.

•

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A Division of Union Carbide and Carbon Corporation

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MEN of Industry

DONALD L. BOYES has been appointed production manager of the Central Foundry Division, General Motors Corp., Saginaw, Mich. **David T. Martin,** until recently executive sales engineer for that division, has succeeded Mr. Boyes as division sales manager. Mr. Boyes previously served as production foreman, assistant production manager and assistant sales manager at the Saginaw Malleable Iron plant of the company and as manager of Central Foundry Division's Lockport, N. Y. plant. Mr. Martin was named a metallurgist at Buick Motor Division, Flint, Mich., in 1936, and later was production foreman at Saginaw Steering Gear Division. Following sales assignments in the Saginaw Malleable Iron plant he became chief inspector there and for the past year was executive sales engineer for Central Foundry Division.

♦ ♦ ♦

Ernest A. Schoefer, formerly executive secretary of the Alloy Casting Institue, has been named to the newly created office of executive vice president. Mr. Schoefer, a graduate of Rensselaer Polytechnic Institute, has been with Alloy Casting Institute since 1940 when it was formed and prior to that with its predecessor, Alloy Casting Research Institute.

♦ ♦ ♦

George J. Leroux, assistant manager, Cleveland Works, National Malleable & Steel Castings Co., has retired following 53 years of service. He joined the old Toledo, O., plant of the company as a foundry timekeeper while attending St. John's College. He became foundry foreman there and in 1918 was made employment manager. The following year he was transferred to the Cleveland Works where he was employment manager until 1926. Since then he has been assistant manager in charge of industrial relations and personnel. Mr. Leroux plans to make his home in the Valencia Apartments, Venice, Florida.

♦ ♦ ♦

Roland D. Block has been named plant metallurgist, Alten's Foundry & Machine Works Inc., Lancaster, O. He was previously assistant plant metallurgist, Cicero Works, National Malleable & Steel Castings Co., Chicago.

♦ ♦ ♦

Alexander M. Cadman Jr. has been appointed treasurer-general manager, A. W. Cadman Mfg. Co., Pittsburgh, and **M. D. Roberts** has been named secretary. **Adam Komoroski** has been appointed foundry superintendent.

♦ ♦ ♦

Sanford H. Bennett has been named chief industrial engineer, Casting Division, Aluminum Co. of America, with headquarters in Pittsburgh. Mr. Bennett, who succeeds the late Rodney C. Rankin, joined the company's Cleveland Works in 1929. **H. E. Cook** succeeds Mr. Bennett as works manager in Buffalo. He joined the sand foundry at the Cleveland Works in 1930. **Norbert C. Hilbrecht** has been named superintendent of the Buffalo Works. He joined the company in 1926. **Sherwood Willard** has succeeded Mr. Hilbrecht as chief industrial engineer in Buffalo.

♦ ♦ ♦

William A. Meissner Jr. has been named deputy director of the Copper Division, Metals and Minerals Bureau, NPA, Washington, succeeding **Joseph F. Miller,** Deal, N. J., who has been named division director. While associated with Farnan Brass Works, Cleveland, in 1942 Mr. Meissner was named to organize the

(*Continued on page* 122)

DONALD L. BOYES
. . . production manager, GMC

DAVID T. MARTIN
. . . GMC sales manager

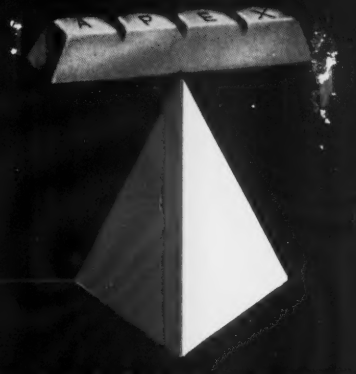
ERNEST A. SCHOEFER
. . . executive vice president

GEORGE J. LEROUX
. . . retires from NACO

APEX

aluminum
magnesium
zinc
alloy ingot

symbol of quality



Research leadership back of every Ingot

CHICAGO • CLEVELAND • LOS ANGELES • APEX SMELTING CO.

FREDERIC C. PERRON
. . . *Bellows sales, New York*

FRANK R. ADAMS
. . . *Saginaw sales, Bellows*

(*Continued from page* 120)
Foundry Branch, Copper Division, WPB in Washington. During Navy service he was in charge of nonferrous metals, Raw Materials Division, Bureau of Ships, and upon recall to active Navy duty in 1950 he served in a similar position with that bureau. Released to inactive duty by the Navy last November he became chief of the Foundry Branch of NPA's Copper Division.

♦ ♦ ♦

J. Goffart, manager of foundries, John Cockerill & Co. Ltd., Seraing, Belgium, was recently elected president of the Belgian Foundry Association. Mr. Goffart worked in the melting department of a foundry in Liege until 1941 when he became associated with Nestor Martin Foundries in Brussels, acting as consultant for its various plants, including the French plant of Arthur Martin Foundries at Revin (Ardennes). He continues as consulting engineer for this plant in addition to his duties with John Cockerill & Co. Ltd., which he joined in 1947.

Frederic C. Perron has been appointed field engineer in southeastern New York and **Frank R. Adams,** field engineer in the Saginaw, Mich., territory, for the Bellows Co., Akron, O. Handling the company's line of controlled air power devices, Mr. Perron's headquarters will be at the office in Mt. Vernon, N. Y., and Mr. Adams will work out of the office in Saginaw, Mich.

♦ ♦ ♦

John L. Campbell has been elected vice president in charge of sales, Ohio Steel Foundry Co., Lima, O., succeeding **T. H. Harvey** who has been named senior vice president. A graduate of Case Institute of Technology, Mr. Campbell joined the company in 1933 and held various positions in the sales and production departments until 1941 when he became general sales manager of Lima plant sales. He was previously associated with Continental Foundry & Machine Co., East Chicago, Ind. Mr. Harvey was manager of the company's Springfield, O., plant from 1918 to 1926 when he was named vice president-sales with headquarters in Lima.

♦ ♦ ♦

George A. Pagonis has resigned as chief of the Magnesium Castings Section, Aluminum and Magnesium Division, NPA Washington. Mr. Pagonis will resume his practice as metallurgical consultant engineer, at 445 South Third St., San Jose 12, Calif.

♦ ♦ ♦

Dr. Raymond F. Schultz, technical director of the Experiment Station, Hercules Powder Co., Wilmington, Del., has been named special assistant to the director of research. **Dr. Peter VanWyck,** associate technical director of the Experiment Station, has been named station director. **Dr. Howard G. Tennent** continues as station manager.

♦ ♦ ♦

Carl E. Rowe has organized Carl E. Rowe & Co., 125 East Wells St., Milwaukee 2, where he will offer engineering service for plant surveys, modernization and reorganization programs and consultation in problems of management, sales and cost reduction. Mr. Rowe has held supervisory positions with International Harvester Co. in Milwaukee and Chicago, and with Carnegie-Illinois Steel Corp., Chicago. Later he was associated with Advance Tool & Die Casting Co., Milwaukee, Lester B. Knight & Associates, Chicago, and Muskegon Piston Ring Co., Sparta, Mich.

♦ ♦ ♦

James S. McCullough was recently named sales promotion manager, Industrial Division, Gould-National Batteries Inc., Trenton, N. J. Mr. McCullough, a graduate of Syracuse University, formerly directed adver-

(*Continued on page* 124)

J. GOFFART
. . . *heads Belgian founders*

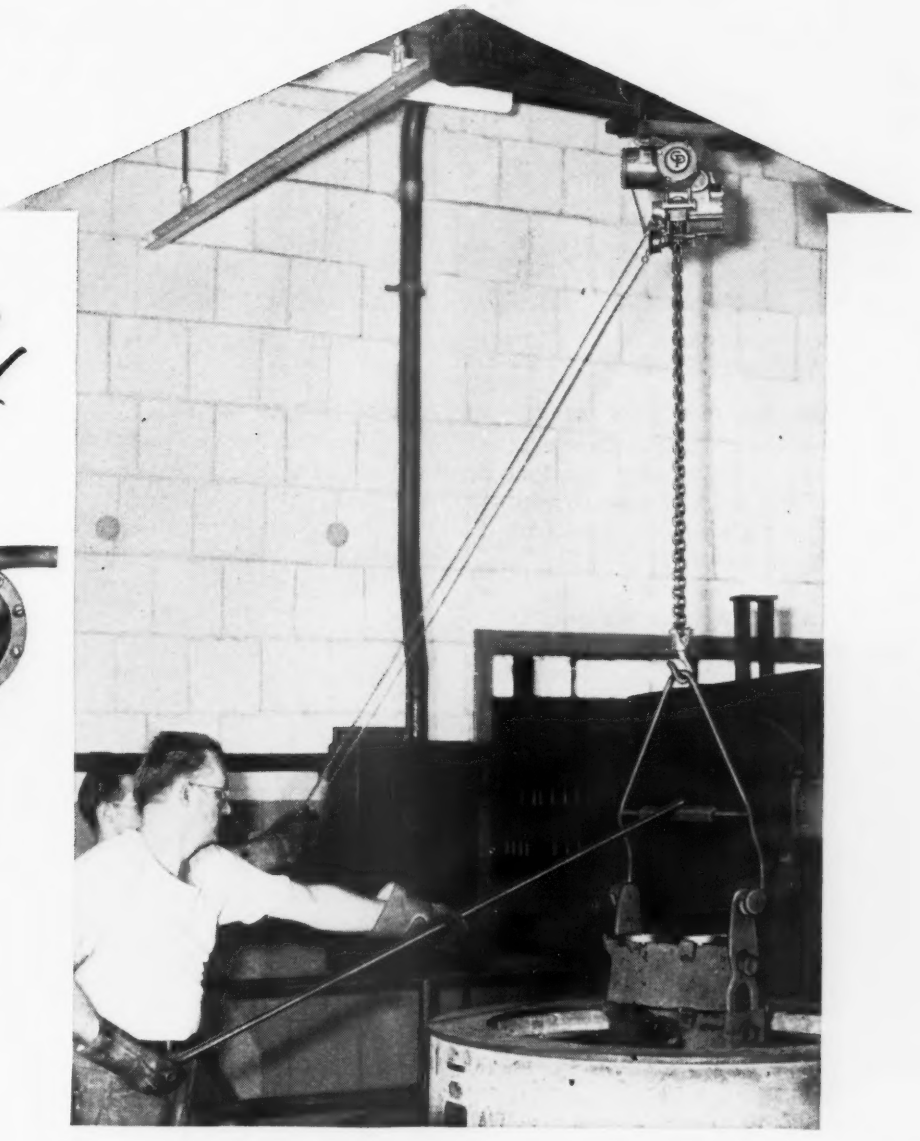
JOHN L. CAMPBELL
. . . *Ohio Steel vice pres.*

CARL E. ROWE
. . . *engineering consultant*

JAMES S. McCULLOUGH
. . . *Gould-National sales*

spots a load quickly-

sets it down gently



Fast and easy operation, outstanding features of the new CP AIR HOIST, are made possible by its variable speed, rotary vane air motor and its highly responsive throttle control.

It can lift a thousand pounds twenty feet a minute — or its speed may be reduced to an almost imperceptible creep.

Its air motor cannot overheat, and has no shock or spark hazard, no switches to maintain.

Automatic braking is provided by self-locking worm gear — no brake bands to adjust or replace.

A millwright can readily carry Air Hoist to any location, since it weighs only 57 pounds.

Furnished in 300, 500, 700 and 1,000 pound capacities.

Write for Bulletin SP-3027.

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PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
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CLAY HENDRICKS
. . . DeWalt sales, Chicago

JEROME H. EIGENBERGER
. . . Milwaukee manager, DeWalt

RALPH N. FITZPATRICK
. . . Electromet district mgr.

JOHN M. BANDEL
. . . vice pres., Electromet

(*Continued from page* 122)

tising for the Industrial Truck Division, Yale & Towne Mfg. Co., Philadelphia, and recently was advertising-sales promotion manager, Lamson Corp., Syracuse, N. Y.

♦ ♦ ♦

Benjamin E. Weimer has been appointed purchasing agent, Wellman Bronze & Aluminum Co., Cleveland, succeeding the late John Wellman. **Malcolm P. Avery** succeeds Mr. Weimer as head of the customer relations department. He was formerly associated with Stalwart Rubber Co., Bedford, O. **William W. Lamb,** formerly vice president-general manager, Ohio Magnesium Castings Co., Cleveland, was recently appointed Wellman sales representative. **Judson S. Wickham** is Wellman's newly appointed director of industrial relations.

♦ ♦ ♦

Edmund Q. Sylvester, vice president and a director of Griffin Wheel Co., subsidiary of American Steel Foundries, Chicago, has been elected executive vice president.

♦ ♦ ♦

Harry C. Davis, general manager, Kanawha Mfg. Co., Charleston, W. Va., was recently elected president of the Conveyor Equipment Manufacturers Association, Washington, succeeding **G. Walter Ostrand,** Link-Belt Co., Chicago. **R. C. Sollenberger** was re-elected executive vice president. Other officers include: Vice president, **R. F. Tomlinson,** the Oliver Corp., A. B. Farquhar Division, York, Pa.; secretary, **Fred S. Wells,** Stephens-Adamson Mfg. Co., Aurora, Ill. Elected directors were: **J. A. Jeffrey,** Jeffrey Mfg. Co., Columbus, O.; **Lee Sekulski,** Mathews Conveyer Co., Elwood City, Pa.; and **R. B. Maas,** Screw Conveyor Corp., Hammond, Ind.

Clay Hendricks has been appointed Chicago district manager, DeWalt Inc., Lancaster, Pa., succeeding **Truman Jones,** who will have charge of government sales for the company. **Jerome H. Eigenberger** has been named DeWalt's district manager for the Milwaukee area.

♦ ♦ ♦

Edward G. Petherick has retired as abrasive engineer for Norton Co., Worcester, Mass., following 25 years with the company. Mr. Petherick worked for Simonds Saw & Steel Co., Fitchburg, Mass., distributor of Norton wheels, from 1906 to 1927, when he joined Norton Co. **Norman R. Ekholm** succeeds Mr. Petherick as abrasive engineer in northern California, southern Oregon and western Nevada. **Arthur C. Cox** will take over Mr. Elkholm's territory in Washington, northern Oregon, Idaho and Montana.

♦ ♦ ♦

Gordon E. Leopold has been named Minneapolis district manager, Harnischfeger Corp., Milwaukee. A graduate of Marquette University, Mr. Leopold joined the company in 1941. Following Navy service he returned to the company and last year was assigned to Minneapolis sales.

♦ ♦ ♦

Bernard H. Regenburg, formerly attorney and secretary, Illinois Tool Works, Chicago, has been elected treasurer, Belle City Malleable Iron Co., Racine, Wis., succeeding **Lester W. Brann** who has retired because of ill health.

♦ ♦ ♦

Nathan H. Bryant, formerly associated with Attwood Brass Co., Grand Rapids, Mich., has been appointed western Michigan representative, Whitfield Chemical Co., Detroit, with headquarters in Grand Rapids.

John M. Bandel has been appointed vice president, Electro Metallurgical Co., division of Union Carbide & Carbon Corp., New York. Mr. Bandel was graduated from Johns-Hopkins University and has been with the Electromet organization since 1941. For the past 7 years he has been concerned with construction and expansion projects for the company. **Ralph N. Fitzpatrick** has been named Cleveland district manager for the Electromet organization, succeeding **E. E. Wright,** who will act as sales consultant in the Cleveland area. Mr. Fitzpatrick has been engaged in sales work with the company since 1943.

♦ ♦ ♦

Bernard N. Ames, senior metallurgist, New York Naval Shipyard, Brooklyn, N. Y., will prepare the 1953 official exchange paper from the American Foundrymen's Society to the Institute of British Foundrymen, on the subject of "Shell Molding."

♦ ♦ ♦

Fred G. Metz has been named sales engineer in Michigan and northern Wisconsin, for Imperial Belting Co., Chicago, with headquarters at 4243 Grayton Road, Detroit.

♦ ♦ ♦

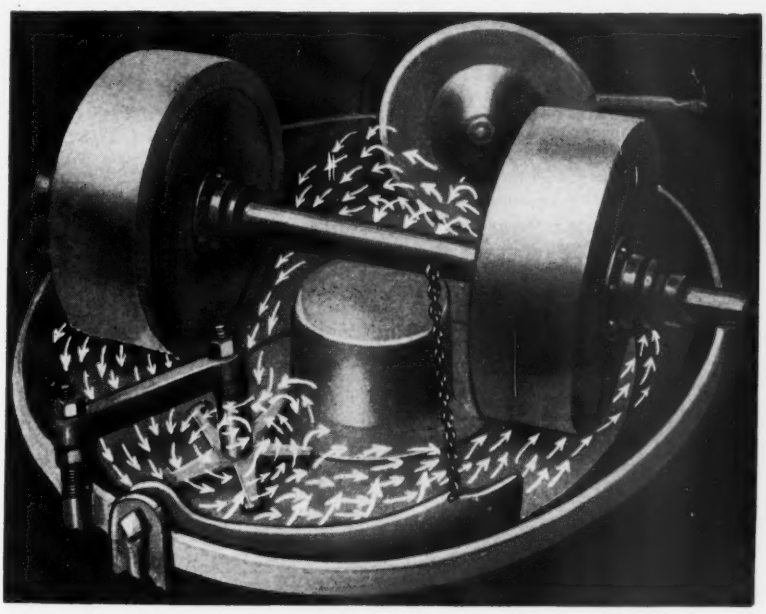
Harlan T. Pierpont Jr., sales manager of the refractories division, Norton Co., Worcester, Mass., has been elected vice president of the Special Refractories Association.

♦ ♦ ♦

R. D. Phelps Jr., secretary, Francis & Nygren Foundry Co., Chicago, was recently elected president of the Chicago Foundrymen's Association. **R. F. Grover,** vice president-general manager, Love Bros. Corp., Aurora, Ill., was named vice president. **C. V. Adams,** works manager, Vulcan Iron

THE *Clearfield* MIXER

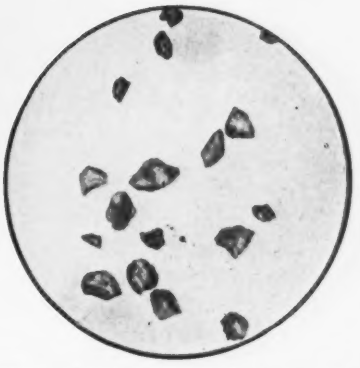
prepares better foundry sand

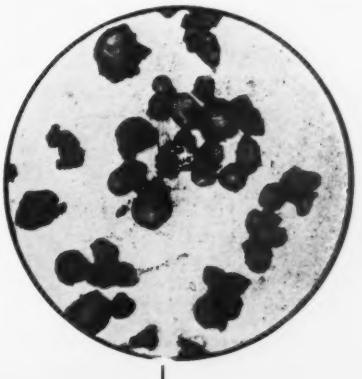


Foundry sand is composed of three principal elements, silica grains, bond and moisture. The quality of this sand depends in major part upon how well these three elements are blended. Therein lies the explanation of the outstanding performances of Clearfield Mixers.

Clearfield Mixers employ the revolving pan principle of sand preparation. The mullers are mounted on a floating shaft and revolve by contact with the moving sand. Centrifugal force together with the stirring action of the agitator and disc transform the sand from an inert mass into a fluid moving stream. The result is a perfect blend of the three elements—and foundry sand that does its job perfectly.

There's a Clearfield Mixer which will meet all your sand preparation needs. Write today for Catalog No. 79 for complete details.





VISUAL EVIDENCE of the effectiveness of Clearfield Mixers is provided by these photomicrographs. Above, unbonded silica sand. Below, the same sand bonded in a Clearfield Mixer.

CLEARFIELD MIXER

MIXES, TEMPERS AERATES

CLEARFIELD MACHINE COMPANY

CLEARFIELD PENNSYLVANIA, U. S. A.

(*Concluded from page 124*)

Works Co., Chicago, was re-elected secretary-treasurer. **Mildred Kosar** continues as executive secretary, at 343 South Dearborn St., Chicago. New directors include Mr. Grover, **C. A. Larson,** Reliance Pattern Works, and **C. T. Milles,** president, Charles H. Milles Foundry Co., Chicago.

♦ ♦ ♦

Walter E. Schirmer, vice president, Clark Equipment Co., Industrial Truck Division, Buchanan, Mich., was re-elected president of the Industrial Truck Association at its annual meeting in New York. Also re-elected were **Prentice Borden,** president, Crescent Truck Co., Lebanon, Pa., as vice president of the association, and **William Van C. Brandt,** secretary-treasurer.

♦ ♦ ♦

Carl N. Brown, since 1950 assistant general sales manger, United States Pipe & Foundry Co., Burlington, N. J., has been appointed sales manager for cast iron pipe. Mr. Brown, a graduate of Brown University, has been engaged in sales work since he joined the company in 1925, previously serving in Philadelphia, Kansas City, Mo., Boston and Chicago.

♦ ♦ ♦

Frank C. Cech, chairman of the Northeastern Ohio Chapter of the AFS, is instructor in patternmaking and head of the patternmaking division, Cleveland Trade School. A native of Vienna, he went to Cleveland in 1903 and was graduated from Ohio State University. His experience in patternmaking covers over 40 years, including the pattern shops of Allyne-Ryan Foundry Co., and Wellman-Seaver Morgan Co., now Wellman Engineering Co., Cleveland. Active in the AFS, Mr. Cech was instrumental in establishment of its Pattern Division, and served as its chairman in 1943-44. He is a member of the advisory board of the AFS Educational Division and Patternmaking Division.

♦ ♦ ♦

Jacob S. Coxey Jr., formerly president and chairman of the board of directors, Industrial Silica Corp., Youngstown, O., has retired as president but will continue as board chairman. Mr. Coxey, with the company 23 years, has been president since 1945. **P. Grant Forman** has been named president, and **Myron E. Ullman,** vice president.

♦ ♦ ♦

C. L. Heater, vice president, American Steel Foundries, Chicago, has been appointed head of the company's new Transportation Equipment Division, assisted by **G. H. Snyder,** vice president, **C. E. Grigsby,** vice persident-sales, **E. A. Walcher Jr.,** vice president-manufacturing, and **R. B. Cottrell,** chief mechanical engineer. **R. D. Brizzolara,** vice president in charge of the company's Elmes & King Division, will also head the newly organized Hammond Division, assisted by **E. L. Krejci,** general manager, **R. W. Clyne,** sales manager, **M. W. Kraegel,** works manager of the Hammond Plant, and **C. E. Tack,** product engineering manager. **M. J. Allen** has been named director of personnel and public relations and **E. J. Walsh** continues as manager of industrial relations.

♦ ♦ ♦

Howard M. Palmer, general sales manager, Lewis-Shepard Products Inc., Watertown, Mass., was recently named president of Material Handling Institute Inc., at its annual meeting in New York. He succeeds **L. West Shea,** who has become a director of the association. Elected with Mr. Palmer to the posts of first and second vice presidents, respectively, were **Charles B. Elledge,** manager of sales, Materials Handling Industries, General Electric Co., Schenectady, N. Y., and **Walter E. Schirmer,** vice president, Industrial Truck Division, Clark Equipment Co., Buchanan, Mich.

♦ ♦ ♦

E. E. McVeigh, since 1940 field and sales engineer, Baker-Raulang Co., Cleveland, has been named manager of commercial sales in its western division. **R. T. Tiebout** has been appointed manager of government sales. **Edmund C. Horman,** until recently with Towmotor Corp., New York, has been appointed regional manager for Baker-Raulang sales in the New York metropolitan area.

♦ ♦ ♦

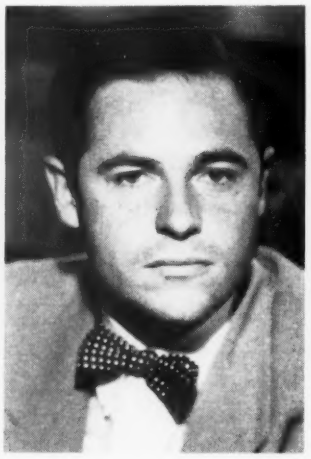
John Hersey has been appointed assistant sales manager, C. O. Bartlett & Snow Co., Cleveland. Mr. Hersey will assist in general supervision of all sales activities and will continue to head the company's coal handling department. **Harry C. Orr,** formerly assistant in the foundry sales department, has been named manager of the products and repair parts sales and service department.

♦ ♦ ♦

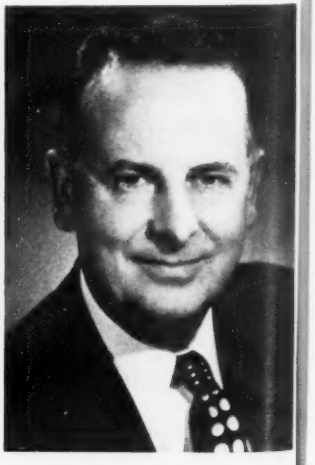
Dallas Amburn, formerly manager of manufacturing engineering, Ford Motor Co., has been named assistant to the sales manager for industrial resins, Plaskon Division, Libbey-Owens-Ford Glass Co., Toledo, O. Mr. Amburn will direct attention to technical counsel for end-users of the division's line of foundry resins. He was previously associated with Chrysler Corp., Detroit, and Pontiac Foundry Division of General Motors Corp., Pontiac, Mich.

FRANK C. CECH
. . . *NEO Chapter president*

HOWARD M. PALMER
. . . *heads Material Handlers*



JOHN R. HERSEY
. . . *Bartlett & Snow sales*



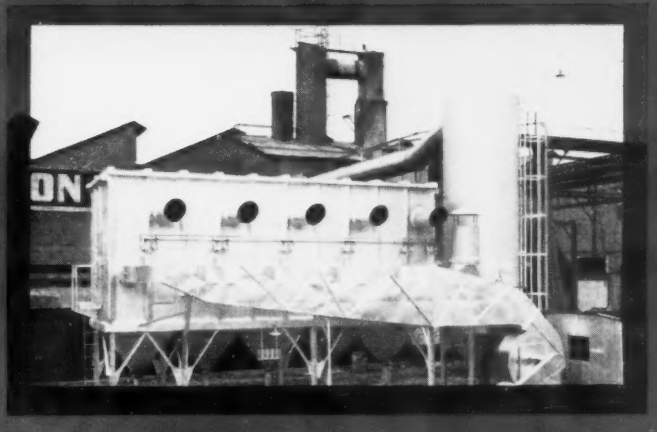
DALLAS AMBURN
. . . *foundry resin sales*

new!

efficient, automatic fume control

for all types of furnaces . . .

electric furnace fumes



cupola fumes

with DUSTUBE collectors

Air pollution from cupolas and other furnaces can now be prevented at a reasonable cost. Dustube Fume Control systems provide virtually 100% removal of fume, discharging only clean gas to the atmosphere.

Operation of Dustube systems can be continuous and automatic. No manual labor is required and no delays are experienced for shaking down the collected fume. Because of their simple design, Dustube Collectors cost less to install, operate and maintain than other types of fume control equipment.

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At the Jeffrey Manufacturing Co., valuable zinc oxide is recovered in a Dustube Collector from the gases released by an electric furnace. Highly efficient recovery prevents fumes from escaping into the atmosphere.

At Lincoln Foundry Corp., a Dustube Collector system has eliminated the discharge of solids from the Cupola. A certificate of approval, without restrictions, from the strict Los Angeles County Air Pollution Board attests to the high efficiency of the system.

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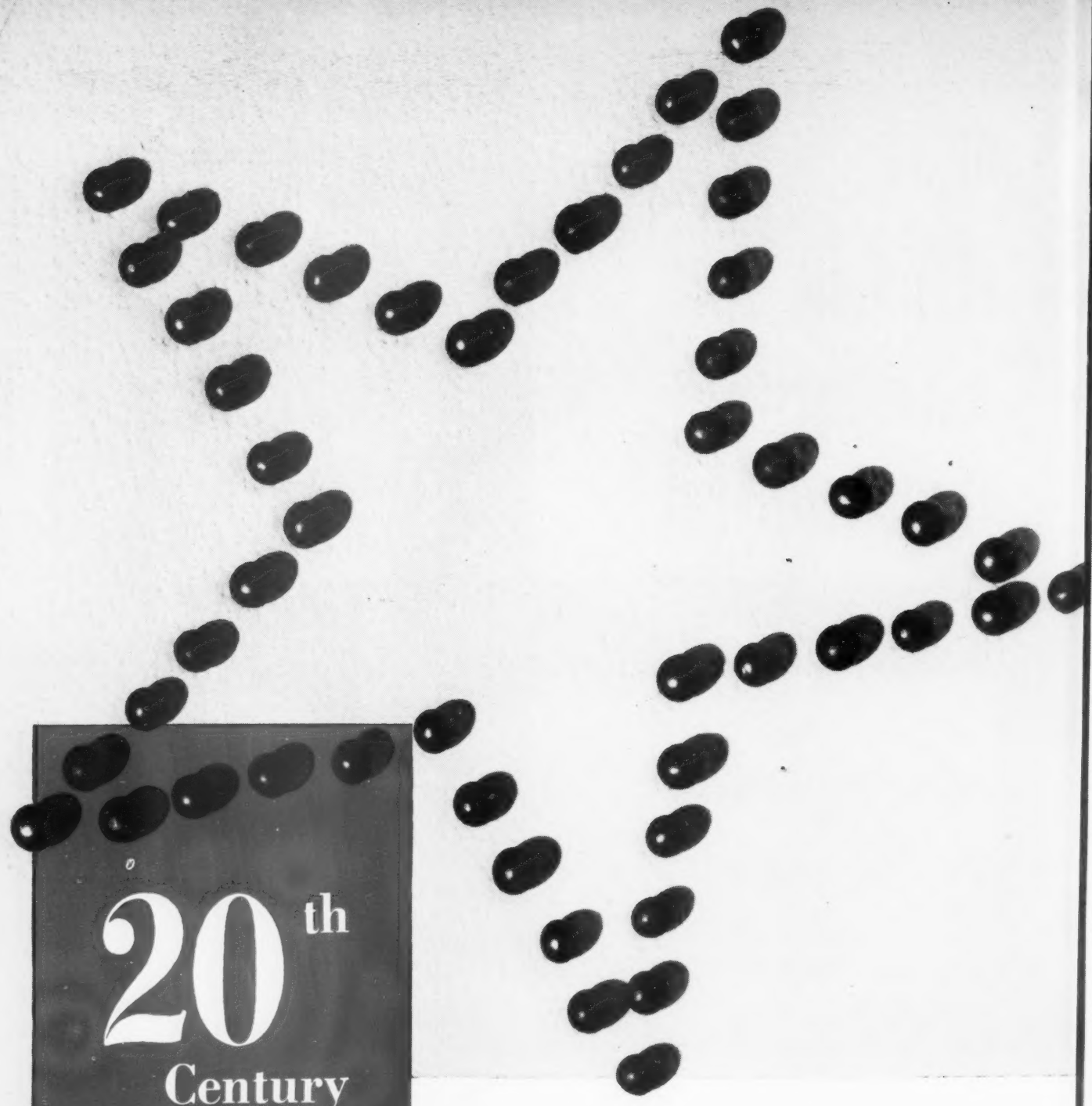

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One of the world's largest producers of *quality* shot, grit and powder —Normalized—Hard Iron—Cut Wire

Foundry STATISTICS

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1950	920,502	512,192	.....
1951			
Oct.	93,884	58,251	238,019
10 mo.	920,9 6	5:6. 51	.....
Nov.	88,210	53,682	220,740
Dec.	76,045	45,543	215,134
Total	1,085,241	656,076	.....
1952			
Jan.	87,003	54,988	202,799
Feb.	82,898	50,129	193,061
Mar.	80,960	49,084	196,896
Apr.	89,270	56,337	198,215
May	81,770	51,476	180,382
June	74,446	46,511	173,353
July	45,266	29,675	166,517
Aug.	63,716	39,308	162,832
Sept.	75,950	45,849	168,367
Oct.	88,062	52,922	238,019
10 mo.	769,341	476,279	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[3]
	Total	Sand	Perm. Mold	
1950	1,056,973	953,590	55,614	.....
1951				
Aug.	95,024	84,503	5,422	84,821
8 mo.	816,258	733,135	47,212	.....
Sept.	89,567	79,676	5,493	84,611
Oct.	99,355	88,332	6,237	82,491
Nov.	92,102	82,270	6,043	82,667
Dec.	80,259	72,813	4,958	80,294
Total	1,177,541	1,056,226	69,943	.....
1952				
Jan.	89,616	80,376	6,233	78,316
Feb.	86,231	77,813	5,204	75,279
Mar.	88,642	79,437	6,182	72,463
Apr.	84,460	75,590	5,914	70,602
May	81,903	73,723	5,420	70,252
June	75,359	67,748	4,858	70,797
July	64,762	58,931	3,637	74,739
Aug.	77,094	70,030	4,830	73,925
8 mo.	648,067	583,548	42,278	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[3]
	Total	Sand	Perm. Mold	Die	
1950	543,082	184,782	181,366	167,201	.....
1951					
Aug.	45,207	17,813	14,452	11,767	117,888
8 mo.	380,582	140,007	124,454	108,919	.....
Sept.	41,864	16,490	11,793	12,293	112,973
Oct.	45,419	17,694	13,495	13,049	110,382
Nov.	41,661	16,278	11,725	12,604	116,044
Dec.	40,907	16,202	11,262	10,891	110,249
Total	550,433	206,671	172,729	157,756	.....
1952					
Jan.	46,424	18,051	12,236	13,884	109,654
Feb.	44,847	17,451	13,445	13,012	110,327
Mar.	46,448	19,017	13,673	12,880	104,749
Apr.	49,824	19,451	14,631	14,482	104,004
May	47,752	18,317	14,292	13,907	100,802
June	45,310	18,452	11,982	13,860	103,685
July	40,091	16,342	10,866	12,341	106,673
Aug.	46,761	18,477	12,397	12,884	112,852
8 mo.	367,430	145,558	103,522	107,250	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[3]
	Total	For Sale	
1950	15,224	13,310	.....
1951			
Aug.	2,957	2,543	16,095
8 mo.	20,745	18,057	.....
Sept.	2,551	2,306	16,407
Oct.	2,977	245	16,143
Nov.	3,946	2,954	15,550
Dec.	2,916	2,525	14,729
Total	33,135	28,596	.....
1952			
Jan.	3,569	3,083	14,047
Feb.	3,368	2,940	14,459
Mar.	3,319	2,972	13,279
Apr.	3,051	2,751	13,244
May	3,002	2,698	13,041
June	2,948	2,699	12,094
July	2,654	2,393	12,948
Aug.	2,722	2,486	13,178
8 mo.	24,633	22,022	.....

Foundry Production Workers

Estimated Number

	Aug. 1952	July 1952	Aug. 1951
Ferrous	236,500	229,000	249,400
Nonferrous	94,800	92,800	90,800

Average Weekly Earnings

Gray Iron	$73.10	$68.66	$68.43
Malleable Iron	73.67	59.81	71.04
Steel	74.51	74.24	76.71
Nonferrous	77.71	74.06	75.91

Average Weekly Hours

Gray Iron	41.3	39.8	41.2
Malleable Iron	39.8	34.0	41.4
Steel	40.1	40.5	42.9
Nonferrous	40.9	40.1	42.6

Labor Turnover Rate (Sept.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	5.9	4.5	3.2	0.4
Malleable Iron	5.0	4.9	3.2	1.0
Steel	4.9	5.6	3.7	1.0
Nonferrous	6.2	5.8	3.9	0.4

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels		Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders
	Total	For Sale	Total	For Sale	Total	For Sale	Total	For Sale	Total[2]	Total[2]	Total[3]
1950	12,905,562	6,880,352	8,117,748	3,415,281	2,308,661	1,043,590	514,074	456,402	1,203,762	761,317	.....
1951											
Oct.	1,301,681	732,764	815,815	382,405	244,556	115,738	53,172	46,483	130,636	57,502	1,983,307
10 mo.	12,771,923	7,196,295	8,188,494	3,832,669	2,186,923	1,055,116	549,643	482,032	1,234,659	611,656	.....
Nov.	1,183,833	674,139	737,971	348,991	222,665	107,569	48,759	43,141	129,766	44,672	1,933,972
Dec.	1,032,799	582,614	646,352	309,696	204,911	94,857	41,594	38,119	108,767	31,175	1,847,065
Total	14,988,555	8,453,048	9,573,347	4,471,539	2,614,517	1,257,542	639,996	563,272	1,473,192	687,503	.....
1952											
Jan.	1,199,285	694,498	745,548	359,806	225,704	110,263	57,155	53,551	125,729	45,149	1,800,905
Feb.	1,155,143	654,833	733,067	348,855	219,251	105,918	50,444	47,649	107,669	44,712	1,766,434
Mar.	1,172,017	660,920	723,225	334,492	228,799	110,607	53,919	49,747	115,843	50,231	1,711,037
Apr.	1,204,801	652,962	773,538	347,121	204,805	85,239	48,506	42,650	117,929	60,023	1,614,426
May	1,100,630	620,049	698,332	317,150	186,998	91,980	44,229	39,848	117,586	53,485	1,459,305
June	835,263	502,322	616,895	292,846	19,467	10,575	44,066	44,066	103,335	51,500	1,445,521
July	636,141	431,889	427,475	227,794	14,794	10,223	40,783	40,783	96,784	56,305	1,409,684
Aug.	1,001,629	602,025	596,369	295,861	198,816	99,760	35,606	35,606	108,313	62,485	1,513,166
Sept.	1,119,373	625,680	676,732	309,299	230,219	107,987	39,912	35,884	107,847	64,663	1,450,723
Oct.	1,233,480	684,321	759,131	340,695	243,462	117,255	45,664	41,148	117,089	68,134	1,391,609
10 mo.	11,657,762	6,129,499	6,740,312	3,173,589	2,772,315	849,807	460,284	430,932	1,118,124	534,687	.....

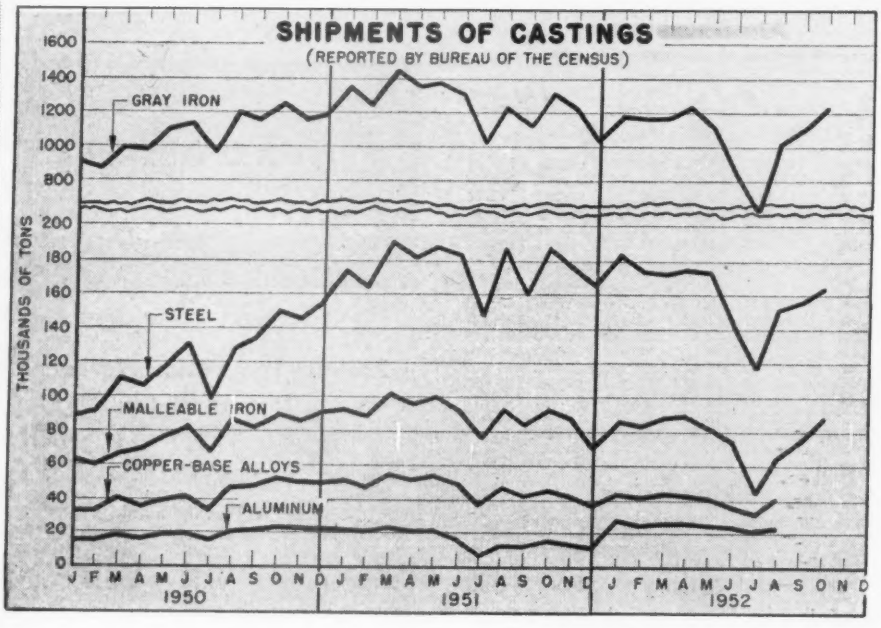
Steel Castings—Shipments

(Net tons[1])

	All Castings			Carbon Steel			Alloy Steel			Unfilled Orders[3]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total
1950	1,459,382	1,042,884	261,357	1,081,162	788,619	243,215	379,220	254,265	18,142	.....
1951										
Oct.	189,929	139,953	39,984	138,610	104,449	36,488	51,319	35,504	3,496	891,508
10 mo.	1,708,216	1,352,179	397,925	1,295,174	978,149	355,475	413,042	273,970	42,350	.....
Nov.	176,728	131,276	35,034	126,544	95,180	31,099	50,184	36,096	3,935	865,029
Dec.	165,110	123,448	33,213	119,762	89,298	29,341	45,348	34,150	3,872	846,436
Total	2,050,054	1,506,903	466,172	1,541,280	1,162,687	415,915	508,574	344,216	50,157	.....
1952										
Jan.	183,738	139,488	37,091	133,985	102,265	31,806	49,753	37,223	5,285	869,299
Feb.	174,626	133,602	31,719	125,484	94,969	28,251	49,142	38,633	3,468	856,872
Mar.	173,694	131,997	32,118	125,787	95,206	27,782	47,907	37,196	4,336	857,115
Apr.	175,075	134,325	33,549	126,628	97,128	29,798	48,447	37,654	3,751	842,970
May	173,635	132,129	35,227	125,309	95,816	30,995	48,326	37,129	4,223	804,695
June	141,628	114,410	30,455	101,850	84,388	26,815	39,778	30,818	3,640	846,459
July	119,036	97,633	20,752	81,576	67,600	18,694	37,460	30,329	2,058	855,046
Aug.	150,232	113,997	24,498	107,203	80,877	21,626	43,029	33,120	2,872	809,354
Sept.	158,392	121,402	20,686	109,011	82,557	17,843	49,381	38,845	2,843	781,929
Oct.	165,155	124,626	23,590	116,201	86,584	20,611	48,954	38,042	2,979	891,508
10 mo.	1,525,211	1,243,609	289,765	1,153,034	887,390	254,221	462,177	359,473	35,455	.....

[1] Source: Bureau of Census. [2] All cast iron pipe is shipped for sale. [3] For sale only.

(Concluded on page 130)



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1951	1952
Jan.	668.0	404.5
Feb.	638.6	200.4
Mar.	599.0	310.0
Apr.	490.1	385.1
May	431.7	225.2
June	393.2	353.8
July	390.3	348.9
Aug.	404.5	311.6
Sept.	346.5	365.9
Oct.	372.4	335.8
Nov.	305.5	258.1
Dec.	230.5	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Coke Production and Consumption

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1950	72,718,038	73,373,618	3,522,398
1951			
Nov.	6,522,300	6,562,279	272,333
11 mo..	72,575,300	72,056,678	3,414,910
Dec.	6,738,759	6,821,446	249,490
Total .	79,133,744	78,868,124	3,664,404
1952			
Jan.	6,804,106	6,760,011	261,148
Feb.	6,358,715	6,411,905	251,125
Mar.	6,779,639	6,743,944	264,488
Apr.	5,806,153	5,770,711	261,972
May	5,961,757	5,882,922	253,605
June	2,472,940	1,772,203	219,909
July	2,376,019	1,621,308	166,377
Aug.	6,039,749	6,204,539	232,249
Sept.	6,180,804	6,517,682	269,029
Oct.	6,449,519	6,792,273	276,427
Nov.	6,316,904	6,417,493	251,033
11 mo..	61,546,371	60,894,991	2,179,905

Ingot Brass and Bronze

(Shipments in net tons)

	1951	1952
March	31,997	23,890
Apr.	30,472	22,547
May	33,267	21,740
June	33,817	21,274
July	32,016	18,947
Aug.	25,286	21,807
Sept.	22,285	22,770
Oct.	23,124	25,811
Nov.	23,544	23,441
11 mo.	311,391	243,753
12 mo.	332,378	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	579,332	376,681	.....
1951			
Aug.	41,045	25,946	80,588
8 mo.	292,961	190,958	.....
Total	494,950	328,183	.....
1952			
Mar.	35,083	23,443	67,846
Apr.	37,312	23,741	63,753
May	35,775	22,410	62,397
June	33,829	21,433	60,719
July	23,462	16,055	57,666
Aug.	29,955	18,794	57,333
8 mo.	301,579	195,289	.....

Pig Iron Production and Consumption

	Production** (Standard grades—1000 net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace, 1000 gross tons) Total	Cupola	Air	Electric
1950	64,589.1	2,870.4	3,034.2	50,450.5	8,234.0	58,416	5,475	319	326
1951									
Nov.	5,824.5	285.5	269.0	4,532.1	737.9	5,287	448	29	9
11 mo.	64,366.5	2,938.9	2,849.3	50,481.6	8,096.7	58,468	5,330	326	125
Dec.	5,898.1	247.4	257.5	4,653.0	740.2	5,282	401	28	11
Total	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Jan.	5,964.3	233.1	285.3	4,672.3	773.1	5,452	466	29	14
Feb.	5,701.8	245.2	261.4	4,496.9	698.3	5,139	441	29	11
Mar.	6,226.2	250.3	273.1	4,895.9	806.9	5,552	483	27	7
Apr.	5,170.0	243.8	218.5	4,069.9	638.0	4,714	446	28	8
May	5,414.2	245.4	236.0	4,295.6	637.2	4,823	412	25	8
June	1,043.2	133.7	108.1	753.6	47.7	991	342	20	5
July	981.6	119.7	113.8	712.9	30.7	845	250	12	8
Aug.	5,767.3	262.9	280.6	4,553.8	669.9	5,063	423	9	8
Sept.	6,069.3	294.7	306.6	4,757.0	710.9	5,363	417	21	9
Oct.	6,415.3	280.0	299.4	5,091.6	744.2	....	....	....	....
Nov.	6,138.9	262.0	315.4	4,842.6	718.8	....	....	....	....
11 mos.	54,892.0	2,571.3	2,698.2	43,147.2	6,475.4	....	....	....	....

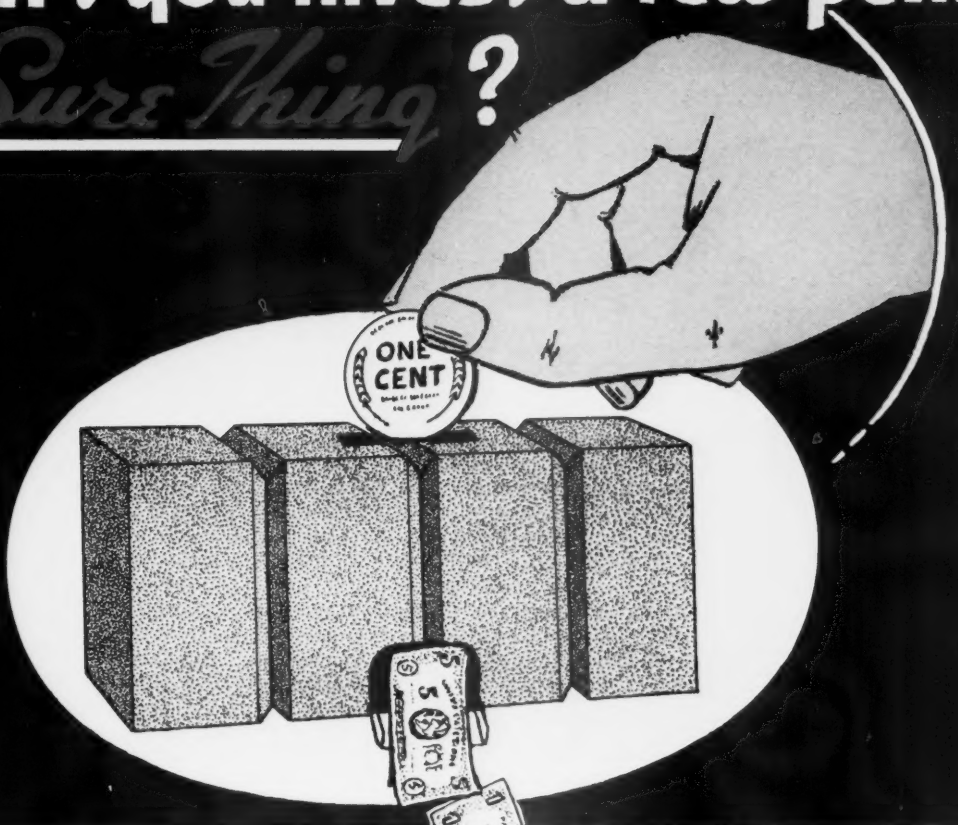
Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap Total	All Scrap Purchased	By Types of Furnace: Cupola Total	Cupola Purchased	Air Total	Air Purchased	Electric Total	Electric Purchased
1950	61,497,000	29,403,000	9,474,000	4,666,000	1,118,000	407,000	6,385,000	3,828,000
1951								
Sept.	5,377,491	2,585,665	811,332	427,035	93,166	38,640	638,941	460,446
9 mo.	51,569,161	25,640,118	8,557,060	4,524,006	922,740	336,340	6,214,856	4,059,634
Oct.	5,869,590	2,826,221	951,406	504,804	102,950	38,534	760,915	459,217
Nov.	5,596,368	2,699,556	847,991	451,591	90,302	33,795	738,589	436,999
Dec.	5,483,089	2,656,536	738,150	398,538	87,748	32,430	687,559	450,155
Total	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,905
1952								
Jan.	5,847,011	2,788,426	846,891	449,985	101,211	38,150	743,233	470,126
Feb.	5,572,506	2,702,092	789,293	419,279	94,900	35,536	697,319	440,325
Mar.	5,902,529	2,860,364	791,165	415,853	92,751	35,013	741,798	475,161
Apr.	5,360,417	2,657,926	834,066	440,035	106,059	38,888	684,818	427,339
May	5,369,268	2,660,471	779,436	404,899	94,597	35,966	700,617	455,460
June	2,048,951	1,169,102	719,739	374,127	82,357	30,412	285,596	173,749
July	1,965,007	1,156,296	524,651	278,750	52,999	19,733	364,536	244,944
Aug.	5,470,696	2,738,593	721,255	348,181	74,351	28,091	682,405	446,543
Sept.	5,782,986	2,862,994	760,092	389,910	82,212	30,493	761,795	501,602
9 mo.	43,319,361	21,596,264	6,766,588	3,493,969	781,437	292,282	5,661,612	3,635,240

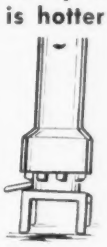
* Source: U. S. Dept. of Interior, Bureau of Mines. ** Source: American Iron & Steel Institute. [1] Source: Bureau of the Census. [2] For sale only.

Wouldn't you invest a few pennies for a *Sure Thing*?



• *A few pennies worth of will increase your profit by making castings better and reducing rejects.*

A little Famous Cornell Cupola Flux, added to each cupola charge of iron, purges molten iron of impurities so that you pour clean metal every time. Furthermore, the iron is hotter and more fluid, and sulphur is greatly reduced.



Many dollars are saved in cupola maintenance, too. Digging out is greatly reduced as drops are cleaner and bridging over is practically eliminated. There is less erosion of cupola lining (longer life) as a glazed or vitrified protective surface is formed on brick or stone.

Isn't it time to investigate? Hundreds of leading gray iron foundries, and *malleable foundries* with cupolas, took this step and are now regular users and boosters.

Would you like the names of users nearest your foundry and have our representative call on you?

Famous CORNELL CUPOLA FLUX

Pre-Measured SCORED BRICK FORM.
(approx. 4-pound brick)

Famous Cornell Cupola Flux is not only the best flux for cleansing iron, but its form makes it the easiest to use —and you avoid waste.

You use approximately one brick to each ton charge of iron, depending on materials used. For smaller charges, you simply break off one to three briquettes (quarter sections) as per instructions.

WRITE FOR BULLETIN NO. 46-B

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

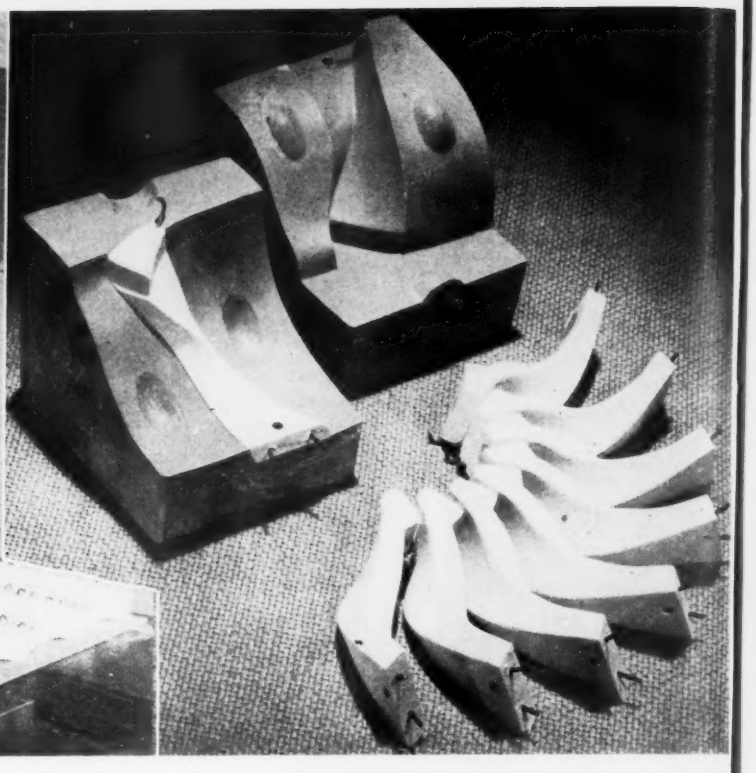
BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

Pouring plaster into plastic corebox to form a core used in casting a high-speed turbine impeller wheel



This plastic corebox shows no signs of wear after being used to produce nearly 52,000 plaster cores

Plaster Cores Formed in PLASTIC COREBOX

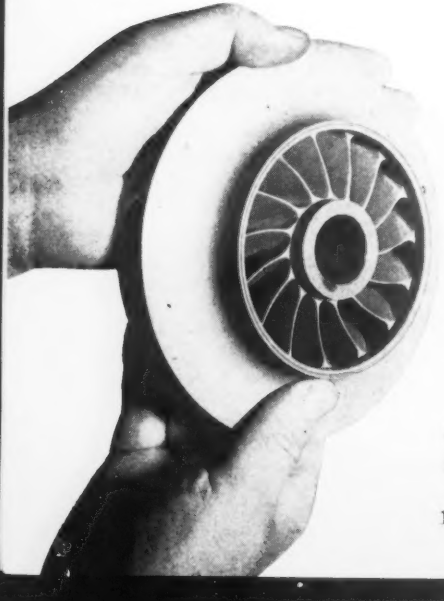
By GILBERT C. CLOSE

A TOTAL of 51,710 cores have been produced from a single, all-plastic corebox by the small foundry of AiResearch Mfg. Co., Los Angeles. More impressively yet, the all-plastic mold is still in use, shows no signs of wear, retains a mirror-smooth internal coring surface and consistently produces cores to within 0.005-in. tolerance.

The company-developed, special plaster from which the cores are made has had no effect whatsoever on the plastic structure or internal finish of the box.

Many of these all-plastic coreboxes are now in use, and most of them have approached the production of the first one. Not one shows any signs of failure. Cost of producing them is about one cent each for material, and a number can be produced in a few hours by unskilled labor.

The cores formed in the all-plastic boxes are subsequently pin-mounted in a steel mold shell and used to produce high-speed turbine impeller wheels by centrifugal casting. The cores form the critical blade sections of the wheel and produce a blade surface that requires no subsequent finishing. These turbine wheels operate in the neighborhood of 40,000 rpm in service. They are cast from No. 356 aluminum alloy at a centrifugal casting speed of 500 rpm.



Plaster cores form the blades in the centrifugal casting of this aluminum turbine impeller wheel

Prior to the use of plastics, these coreboxes were made from conventional dental stone. The stone boxes cost around $16 per hundred to produce (for material only) and required highly skilled labor. Frank Warga, AiResearch foundry foreman, says that a maximum of 1500 cores could be produced with the stone units. "After that," Warga says, "the coring surfaces in the stone were softened by the water in the core plaster, and both surface finish and dimensional tolerances deteriorated."

The material used in the plastic box construction is called Rezolin 8000 Tool-Plastic. It is available from Rezolin Inc., 5736 West 96th St., Los Angeles 45.

Production of the coreboxes is a simple procedure. Just prior to use, 100 lb of the plastic is mixed with 25 lb of Rezolin accelerator paste which acts as a catalyzer. The boxes are poured, then cured in an oven at 160° F. From 12-16 hours is required to cure boxes weighing up to 100 lb. Larger sizes require 16-24 hours curing time. AiResearch is not using any of the larger sizes as yet, but the figure pertaining to them was obtained from Northrop Aircraft Inc., where the same plastic is used in many tooling applications.

An added advantage of the plastic coreboxes is ease of repair. If one becomes chipped or cracked, the cavity is filled in with the same mixture

(*Concluded on page* 134)

SMITH L-O CORE OIL

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Here is the *controlled-quality* oil . . . Dow-Therm processed by an indirect heating method to assure consistently uniform production during every run. Smith L-O provides excellent workability . . . is maximum *fast-drying* at temperatures ranging from 500° down to 350° thus providing greater core oven output.

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SMITH OIL & REFINING CO.

MANUFACTURERS OF L-O AND CERTIFIED CORE OILS

INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

(*Concluded from page 132*)

used in the original construction, smoothed off, then cured at 160°F by an infra-red lamp.

The only post-casting core work necessary when the plastic boxes are used to produce impeller blade cores is removal of a slight "flash" along the two core edges where the mating surfaces of the box come together. This operation can be done with a thumbnail or with a small metal scraping tool. Upon removal of the core from the box, the surface is mirror-smooth to the touch.

An AiResearch-modified sterene parting compound is used. This compound had to be applied prior to each cast when the stone boxes were used, but with the plastic type, one application in every four or five casts suffices.

The plastic is a thermosetting liquid phenolic resin, generally considered somewhat brittle after curing. "But," says Warga, "we haven't broken or cracked a plastic box to date, despite normal foundry handling. We have chipped a few outside corners where the injury can do no harm."

Because the plastic boxes are much lighter than the old dental stone ones, they are easier to handle. "They are ideal for high-production items," Warga points out. "And in our particular application, where a superior as-cast surface is required and constant dimensional tolerances are necessary to obtain a maximum degree of balance for the high-speed impeller blades, the plastic core boxes not only have speeded production, but also have reduced foundry costs.

OBITUARY

WILLARD H. ROTHER, 67, for 41 years with Buffalo Foundry & Machine Co., Buffalo, which later became Buflovak Equipment Division, Blaw-Knox Co., died Dec. 12 in Toledo, O., where he had lived since retiring in 1951. Mr. Rother, a national authority on gray iron, joined the company in 1910.

* * *

Kent S. Clow, 64, president, James B. Clow & Sons, Chicago, plumbing and waterworks supplies, with foundries in Coshocton and Newcomerstown, O., died Dec. 14. Mr. Clow was also president of the Clow subsidiaries, Eddy Valve Co., Waterford, N. Y., and Iowa Valve Co., Oskaloosa, Iowa.

* * *

Alfred M. Jones, mid-west sales representative for International Graphite & Electrode Division, Niagara Falls, N. Y., subsidiary of Speer Carbon Co., St. Marys, Pa., died Dec. 8. Mr. Jones had been with the company since 1934.

* * *

Martin M. Bodkin, 60, melting superintendent, Strong Steel Foundry Co., Buffalo, died Nov. 9. Mr. Bodkin joined the company in 1914 as a crane operator, and was later transferred to the open-hearth department, becoming superintendent in 1923.

* * *

John E. Ertler, 57, partner in the Miller-Ertler Studios, Cleveland, and owner of Ertler Photo Equipment Co., there, died Dec. 16, following a heart attack. Mr. Ertler was well known in foundry circles for his convention and group photographs, as well as pictures of foundry and plant installations for illustrating technical articles.

* * *

Joseph P. Wright, for 17 years executive vice president, Western Foundry Co., Chicago, died Dec. 16. Prior to his association with Western Foundry Mr. Wright was an executive of National Malleable & Steel Castings Co., Cleveland.

* * *

Thomas H. Gregg, 53, president of the Thomas H. Gregg Co., Milwaukee, foundry supplier, died Jan. 3. Prior to establishing the company in 1931, Mr. Gregg was in traffic engineering work for 12 years.

* * *

Chester O. Barnes, for the last year sales manager of the hoist division, Harnischfeger Corp., Milwaukee, died there Dec. 17. Mr. Barnes had been engaged in sales work with the company since 1941.

* * *

Roy C. Schwenk, 65, founder and owner of Western Pattern & Foundry Co., Seattle, died Dec. 14. Mr. Schwenk established the company in 1907 and retired in 1948.

* * *

Raymond L. Johnson, 65, sales manager, John R. Forbes Foundry & Iron Works, Jersey City, N. J., died Dec. 29, following 40 years with the company.

* * *

Stephen G. Hodgson, 70, president and one of the founders of Hodgson Foundry Co., Chicago, died Dec. 21. He had been in the foundry business about 45 years.

* * *

Louis W. Kagel, 78, until his retirement in 1947 secretary-treasurer of the former Kagel Brass Foundry, Milwaukee, died Jan. 8.

* * *

Joseph Volarcik, 52, foundry foreman, Standard Brass Foundry Co., Cleveland, died Dec. 4. Mr. Volarcik had been with the company 37 years.

* * *

W. E. Byrne, 58, mid-west district manager in Chicago for Simonds Abrasive Co., Philadelphia, died Dec. 27.

* * *

Jervis B. Webb, 62, founder of Jervis B. Webb Co., and Huron Forge & Machine Co., Detroit, died Dec. 21.

* * *

Charles S. Swett, 73, former vice president and director, Swett Iron Works, Medina, N. Y., died Dec. 14.

* * *

Charles A. Eviston, 73, personnel director, Harrison Steel Castings Co., Attica, Ind., died Dec. 14.

SOUTHEASTERN FOUNDRY GROUPS

To Meet in Birmingham, Feb. 19-20

BIRMINGHAM District and Tennessee Chapters of the American Foundrymen's Society will join in sponsorship of the 21st annual Southeastern Regional Foundry Conference to be held at the Tutwiler Hotel, Birmingham, Feb. 19-20.

In addition to two days of technical sessions, a trip to the University of Alabama, Tuscaloosa, Ala., is planned for Wednesday, Feb. 18. Visitors will leave the Tutwiler Hotel, Birmingham, at 10 a.m., have lunch at the school, inspect the university foundry, and return at 3:30 p.m. Plant inspections in the Birmingham area are scheduled for Friday morning. Entertainment will be provided Thursday evening.

AFS Vice President Collins L. Carter and Secretary-Treasurer W. W. Maloney will speak at the Thursday luncheon, and the banquet speaker Friday evening will be Hugh Comer, board chairman, Avondale Mills, Birmingham.

The technical program follows:

Thursday, Feb. 19

9 a.m.—Registration.

10 a.m.—"Effect of Gating Design on Casting Quality," talk and movie, by S. C. Massari, technical director, AFS.

11 a.m.—"Problems Encountered in the Production of Thin-Walled Castings," by Oscar J. Stoesser, Crane Co., Chattanooga, Tenn.

1:45 p.m.—"Shell Molding," by Richard Herold, Borden Co., New York.

3:15 p.m.—"Mechanical Equipment for Shell Molding," talk and movie, by Floyd R. Schulz, Mechanical Handling Systems Inc., Detroit.

4:15 p.m.—"The Invisible Shield," talk and movie, by L. C. Beers, Claude B. Schneible Co., Detroit.

Friday, Feb. 20

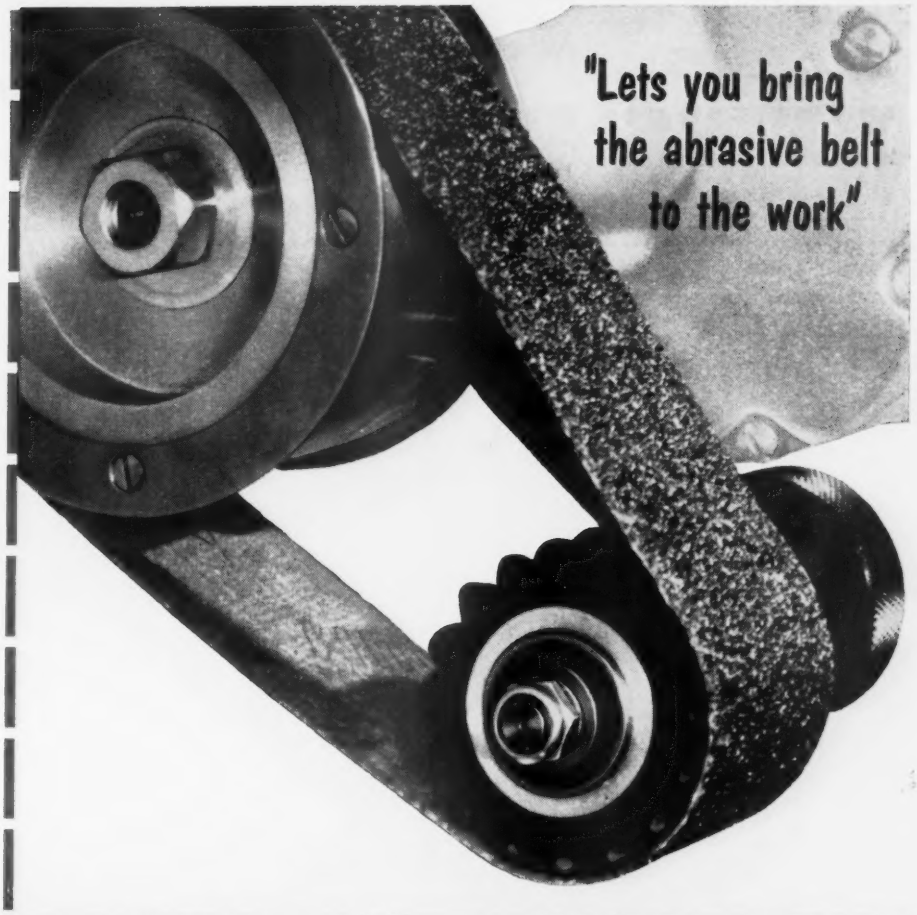
9 a.m.—Plant visitations.

1:30 p.m.—"Developments to Date in Ductile Iron," by Keith D. Millis, International Nickel Co., New York.

3:10 p.m.—"Effects of the Carbon Equivalent on the Properties of Cast Iron," by Warren C. Jeffery, Edwin E. Langer Jr., Chulan D. Azizi, University of Alabama, Tuscaloosa, Ala.

4:30 p.m.—"Cupola Operation," by J. Robert Cardwell, Stockham Valves & Fittings Inc., Birmingham.

Grind FASTER with BELTS ...at less cost!



2 NEW MODELS "61" Port-A-Belt GRINDING ATTACHMENTS

Now CARBORUNDUM offers *four* portable belt grinding attachments to help you increase production and cut costs. The two newest models of the "61" PORT-A-BELT Grinding Attachment permit your operators to reach additional hard-to-get-at spots because the "61" serrated rubber contact wheel is mounted on the extended arm and the idler pulley on the tool spindle. Thus these new models complement the two present ones with the "61" contact wheel on the tool spindle.

All four "61" PORT-A-BELT attachments fit nearly all standard-make horizontal portable grinders—electric or air. All four use the revolutionary "61" wheel principle: belts grind faster, last up to twice as long. There is no bounce...no chatter. One operation often replaces two or three conventional finishing operations.

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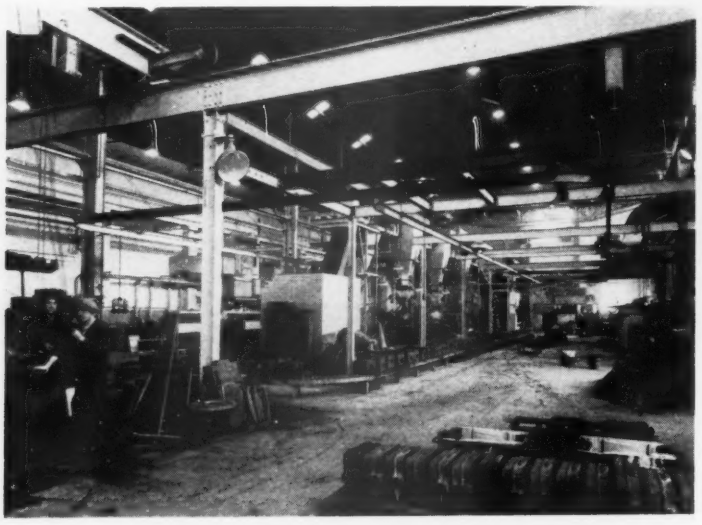
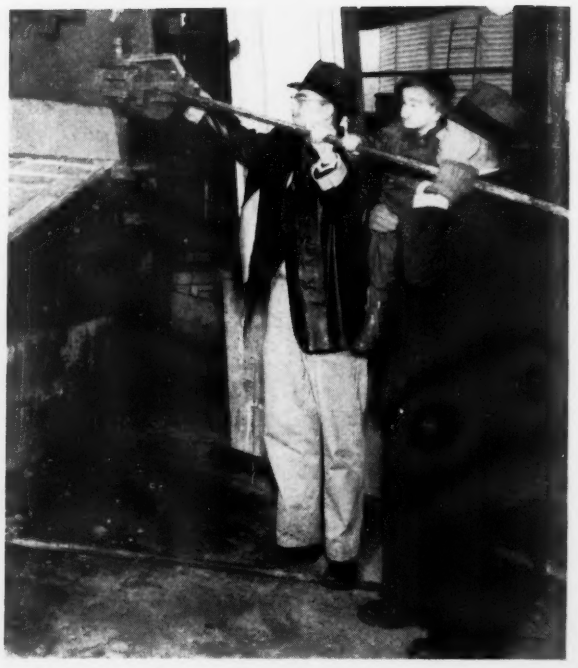
NEWS VIEWS

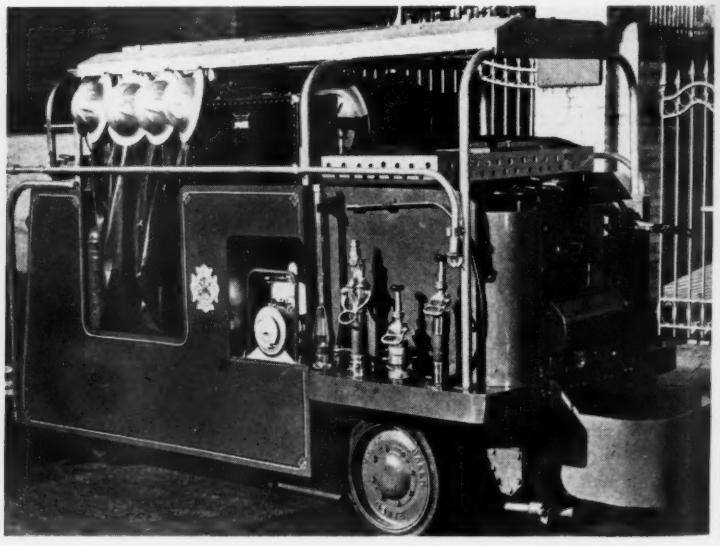


NEW FOUNDRY: New nonferrous foundry of George Kent Ltd. at Luton, England, is highly mechanized and incorporates modern sand handling and reclamation equipment. The installation occupies 20,000 sq ft and is now producing 15 tons of sand castings per week, in weights from a few ounces to 3000 lb, in fifteen or more different alloys. Production began last August. The castings are used in a variety of types of Kent meters.



FURNACE LIGHTER: With just a little help from granddad, 2-year-old John Ashby Marshall lights Pittsburgh Coke & Chemical Co.'s newest blast furnace, at Neville Island. His grandfather, right, is R. M. Marshall, company president, and his father, left, is C. Taylor Marshall, assistant to the manager of the Neville Island plant. The $8 million furnace will add 300,000 tons yearly to the firm's pig iron capacity, bringing it to a total of 800,000 tons.

BLAST FURNACE BELL: Cast at the Bethlehem, Pa., plant of Bethlehem Steel Co., this blast furnace bell weighs 26 tons and has an OD of over 16 ft. At this point, the bell has been rough machined on the outside. Balancing blocks are welded to inside.



INDUSTRIAL FIRE-FIGHTING UNIT: Converted from an electric industrial truck, this industrial fire-fighting unit travels on its own power and rides the plant elevator to any floor of the multi-story Edgewater, N. J., works of Aluminum Co. of America, where it was developed by the maintenance department. The truck contains complete equipment for all types of fires, for the protection of the fire crew and for first aid treatment.

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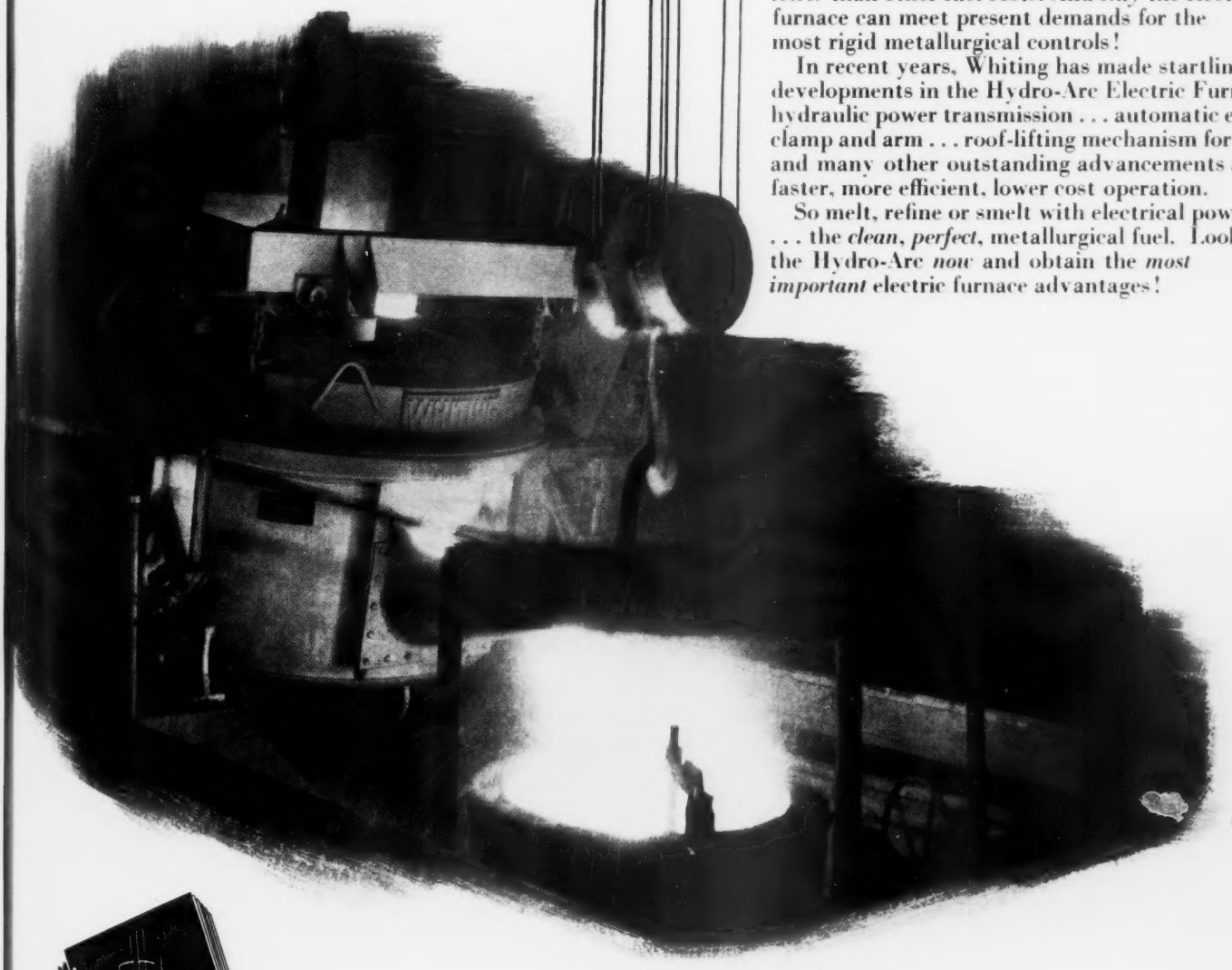

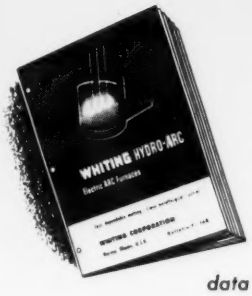

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AROUND THE COUNTRY

News Reports from . . .

Chicago

TWO government-owned but privately operated defense plants here were in the news recently because of changes in production programming for the military. Both have their implications in output of castings. In one instance it appears pressure for production will lessen; in the other it will accelerate.

In December, the Army announced it will start to slow down output of medium and light tanks in the fiscal year starting July 1. The new schedule means there will be 55 per cent fewer medium tanks on hand by early 1954 than originally planned. Decision to stretch out production is based on the Defense Department's policy to place principal reliance in creating military facilities which can be speeded up when necessary rather than accumulating equipment that might become obsolete. Involved in the pattern change, although details aren't known, will be the cast armor plant which American Steel Foundries operates at East Chicago, Ind. The facility, revitalized last year, has been making hulls and turrets for the M-47 and M-48 medium tanks.

The other development is that Ford Aircraft Engine Division has received a $20 million supplement in the contract for manufacture of Pratt & Whitney J-57 turbojet engines. This raises to $97 million Ford's allocation for jet production.

Ford reopened the plant in 1950 to make Pratt & Whitney Wasp-Major piston-type engines. In January, a year ago, the Air Force announced the plant would shift to jets and the piston-engine program phased out. Deliveries of first jets are set for February, 1954. Output of piston-type engines will hit a peak in 1953, then taper off.

Experimental foundry, forging and machining operations for the J-57 have been going on since October. Just recently the fourth and last production line in the magnesium foundry was started up.

The plant makes parts for other aircraft manufacturers, currently having ten such parts under production in the magnesium foundry.

Gray iron foundries in this area are operating at a somewhat higher level. Jobbing foundries report orders coming in at a better level. No materials problems are anticipated, there being enough pig iron to go around.

Included in foundry orders are releases for fractional and small horsepower electric motors. A good segment of this demand for motors comes from the air conditioning industry which apparently is preparing for a big expansion in its sales volume this coming summer.

Los Angeles

WELCOME relief to local foundries squeezed between too-low price ceilings and too-high costs was brought about by OPS in authorizing increases in prices of gray iron and steel castings, effective Jan. 2. An order, effective Dec. 19, issued previously, had raised ceiling prices of malleable iron castings.

Recent OPS surveys indicated that current cost increases for foundries have reduced earnings, and ceiling price increases supposedly will restore earnings to 85 per cent of average of the three best years in 1946-1949. Local foundrymen consider the price increase authorizations satisfactory: 5 per cent for steel castings, 9 per cent for gray iron castings, and 6.2 per cent for malleable castings. However, they question whether the competitive situation will permit full application of the higher ceilings.

Foundry activity is varied. Reversing the usual seasonal trend of decline, December was a very good month for most foundries. January started out at a lower level for iron foundries, with nonferrous foundries lagging behind. Leading the activity parade were steel foundries supplying the petroleum and refinery industries. Backlog of steel foundries average 60 days while iron foundries are booked ahead only about two weeks. With oil well drillers and refineries specifying steel castings in large numbers, activity of steel foundries is accelerating and is expected to be sustained.

For nonferrous foundries 1952 was a better year than 1951, but, like other foundries, taxes took a bigger bite than previously. Currently nonferrous foundries are at about the same level of activity as in December but decreasing numbers of inquiries for aluminum and brass castings is causing concern.

All materials are freer than previously. Pig iron of better quality is reported in improved local supply with nearby blast furnaces making pig available to the trade. Prices of Australian pig in an initial shipment, offered at less than district furnace prices, closed to the prevailing price level of domestic iron by second shipment. Coke is abundant but supplies from the East are somewhat lighter.

Philadelphia

ALTHOUGH gray iron shops have largely recovered from the holiday lull, they are averaging no more than 65 to 70 per cent of normal operation, with backlogs light. Most captive shops are operating at a fairly high level, but the average jobbing foundry is lucky if it can maintain a five-day week schedule, with restricted help. Pressure pipe shops are experiencing a lag, which may continue into March. Soil pipe shops are operating at the lowest ebb in months. However, this situation at the pipe shops is regarded as being largely seasonal. Little defense work noted.

Malleable foundries are undergoing a continued lag, operations now

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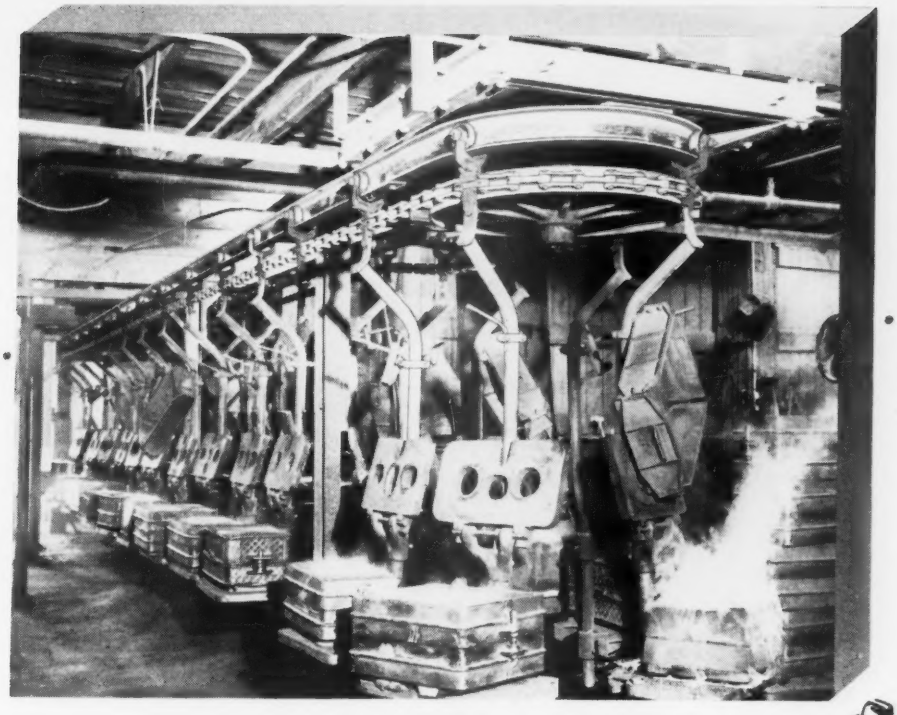

mechanized handling benefits everyone

● In the Foundry Industry, as in all others, the advantages of mechanization are far-reaching. The production of more and better castings, at less cost, which is made possible by modern foundry equipment, benefits the foundry employees, management, the shareholders or owners and the purchasers of the products on which the castings are used. It might be an automobile, a home appliance, an outboard motor, a farm implement or any one of a thousand products which are made better by the use of castings. The application of modern foundry equipment, and the efficiency and economy which it creates, is bringing more good things within the reach of more people.

Well-planned conveyer systems are usually pretty important in foundry mechanization programs. Today, Mathews Engineers are making available to American and Canadian Foundrymen the benefit of long experience with foundry conveying problems. This, and the facilities of three modern plants, is yours for the asking. Write or wire today for catalogs. Engineers in all principal cities.

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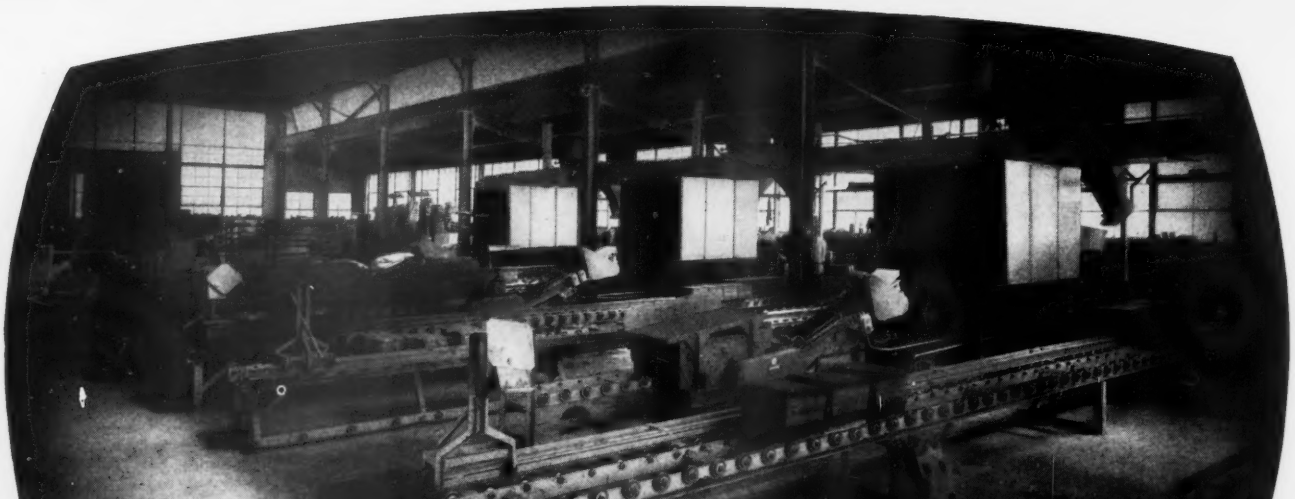

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The Nelson Foundry Co., Morton Grove, Illinois, has increased their production 35% by using a combination of 3 Reddy Sandys and 3 Twin Hopper Handy Sandys. These units make sand conditioning and handling practically automatic thereby saving many manhours in the production of Brass and Aluminum Pressure-Tight castings. It is only necessary to dump the molds on the vibrating shakeout deck of the Reddy Sandy. The sand continues automatically through screening, magnetic separation, tempering and a double aeration until it is deposited in the hopper of the Handy Sandy for convenient use by the molder.

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Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

(*Concluded from page* 138)

averaging little, if any, better than the gray iron shops. However, operators anticipate a fairly early improvement in demand from agricultural implement manufacturers and also a betterment in railroad equipment requirements, particularly in view of the possibility that car builders soon may be receiving more rolled steel, which will enable them to step up their operations and in so doing consume more castings.

With a heavy defense demand, amounting to perhaps 45 per cent of total business, steel casting makers are maintaining high operations. However, new work is falling a bit short of outgoing shipments, and backlogs are lighter. Nevertheless, most steel foundries still have four to five months' work on hand.

Nonferrous shops report fairly active demand. Defense business is still providing a good stimulus and in the main their operations are at a definitely higher level than in the gray iron and malleable divisions. On the other hand, operating rates are not comparable with steel foundry rates —at least not on an average.

Ferrous shops report no difficulty with regard to raw materials. Pig iron supply is adequate, scrap is more than adequate and coke is plentiful. Apart from copper, most nonferrous shops report raw material supply as adequate.

Recent advances in price ceilings, as granted by Washington, don't appear to have discouraged business, foundrymen declare. Buyers would rather not pay the higher prices, but realize the higher quotations now being made by most foundries are reasonably justified by the higher costs that have developed over the past couple of years, or since the former ceilings were imposed in January, 1951. The mark-up in labor cost has been the principal expense.

GRAY IRON foundry operations have generally recovered from the year-end lull. District shops are now averaging around 70 to 75 per cent of normal, with those engaged in heavy work, notably machine tool castings, making the best headway. Some of these latter have backlogs of two months or more. Shops engaged in light production work still find the going rather slow. Some have backlogs extending no more than a couple of weeks.

Disappointment is expressed in some quarters over failure of demand from durable goods manufacturers to pick up more rapidly. Foundrymen admit that they might have set their sights too high, but that nevertheless it is not up to what they had expected for this time. Steel casting demand continues active, though leveling off somewhat.

Nonferrous operations are good, better, in fact, than in some adjacent districts, and this is ascribed in part to business at some of the captive shops in this area. Captive shops particularly active at present are those engaged in requirements for meters, gyroscopes, various types of precision instruments, pumps, and propeller wheels and other maritime specialties.

Book Review

Transactions of The American Foundrymen's Society, Vol. 60, 1952; cloth; 862 pages 8 x 11 in., including a 9-page index; published by the American Foundrymen's Society, 616 South Michigan Ave., Chicago.

Commencing with a list of officers and directors, and a summary of proceedings at the 1952 annual convention at Atlantic City, N. J., this volume covers the president's annual address, treasurer's report, secretary's report, breakdown of AFS membership by chapters, report of the technical director, report of meetings of the board of directors, and the Charles Edgar Hoyt annual lecture delivered by John S. Bugas.

The remainder of the volume, approximately 800 pages, covers the text of 100 technical papers, including exchange papers from foreign foundrymen's associations, also a transcript of the discussion following presentation of each paper.

Meetings of Interest to Foundrymen

Feb. 6-7 — California Regional Foundry Conference, sponsored by Northern California Chapter, AFS, and University of California, with meetings at the university and at the Hotel Claremount, Berkeley, Calif.

Feb. 12-13—Wisconsin Regional Foundry Conference, sponsored by Wisconsin Chapter, AFS, and University of Wisconsin, Schroeder Hotel, Milwaukee

Feb. 16-19—Second Annual Industrial Ventilation Conference, co-sponsored by School of Engineering, Michigan State College, and Division of Industrial Health, Michigan Department of Health, at Kellogg Center, Michigan State College campus, East Lansing, Mich.

Feb. 19-20—Southeastern Regional Foundry Conference, sponsored by Birmingham, Tennessee, and University of Alabama Student Chapters, AFS. Tutwiler Hotel, Birmingham

Mar. 2-6 — American Society for Testing Materials, spring meeting, Statler Hotel, Detroit

Mar. 11-12—Foundry Educational Foundation, annual TAC-UAC conference, Cleveland

Mar. 17-18—Steel Founders' Society, annual meeting, Edgewater Beach Hotel, Chicago

Mar. 23-27—American Society for Metals, western metal congress and exposition, Pan-Pacific Auditorium, Los Angeles

Mar. 25-27—Society of Automotive Engineers, national production meeting, Hotel Statler, Cleveland

Mar. 31-Apr. 2—Magnesium Association, international magnesium exposition, Washington National Guard Armory, Washington

Apr. 9-10—Malleable Founders' Society, fourth annual market development conference, Illinois Institute of Technology, Chicago

May 1, 1953—American Association of Spectrographers, symposium, Chicago.

May 4-8—American Foundrymen's Society, annual convention, Chicago

May 18-22—Material Handling Institute, fifth national materials handling exposition, Convention Hall, Philadelphia

June 8-10—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

June 29—July 3—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City

Sept. 21-22—Steel Founders' Society, fall meeting,, Homestead, Hot Springs, Va.

Sept. 21-25—Instrument Society of America, national congress and exhibit, Sherman Hotel, Chicago

Oct. 8-9—Gray Iron Founders Society, annual meeting New Hotel Jefferson, St. Louis

Oct. 8-9—Michigan Regional Foundry Conference, Kellogg Center, Michigan State College, East Lansing, Mich.

Oct. 15-17—Foundry Equipment Manufacturers' Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

MAN-TO-MAN

on the Molder's Bench

"Acres of Diamonds"

By RALPH L. LEE

A YOUNG friend of my son has been dropping in on the Lee Hobby Foundry ever since he was a little boy. I realize of course that he hasn't been coming just to see me—my son Ralph has always been the principal attraction—but even though he isn't particularly interested in the foundry, he always manages to spend some time with me, looking around to see what's new since his last visit. Then, after paying his respects to my pet interests, he gets around to his, a little factory of which he is the top boss, young as he is.

He and his several dozen employees manufacture an electrical appliance for the home in competition with just about everybody and his uncle. His product is just about as conventional as a product can be, something on the order of a teacup or a pair of micrometers in this respect. It could hardly be any different from what it is, and there are only a few ways to make it.

In spite of all this, the little business goes pegging right along, through thick and thin, earning a *darned* good living for Bill (that truly is his name) and the folks who have been sticking with him year after year. I wouldn't even think of hinting that Bill accidentally fell into a soft snap, for he didn't. He's had to be right up on his toes, and the thing about his toe dance that strikes me as deserving special note is that he hasn't pulled any rabbits out of hats, made any momentous discoveries, stumbled over any secret formulas or pulled any fast ones.

I know from sources other than Bill that he worked himself up some darned good accounts and that once he had them he didn't let them down or let them get away from him. He coddled them, but not to the point of giving away his shirt.

When he took over the business, it was saddled with some ancient punch presses and die equipment. Competition with more money and modern equipment behind it had Bill and his helpers jumping through hoops for a spell, trying all sorts of stunts with the old equipment to match shrinking prices.

There wasn't enough capital or production to justify getting into any equipment race. So Bill shopped around among stamping concerns until he found one just his style and size. I don't think anyone could possibly see even a touch of genius in this move, but I am sure you and I know of any number of outfits that folded up because of their consistent failure to use this brand of common horse sense.

Bill's product has one rather disagreeable feature in common with those of all of his competitors' products, which has more or less been taken for granted as the nature of the beast—noise under certain conditions, like that from air drills, buzz saws and vacuum cleaners. Bill, with a twinkle in his eye, protests a little too much about not being an engineer, and I've told him as much. But even though he's not a graduate and would need help on some designing jobs, he has been racking his brain for some simple way to get rid of the noise nuisance.

Although he says he hasn't done the actual work itself, I learned through the grapevine that he's been a sweetly stubborn burr under the tails of helpers seeking ways and means of licking the problem. Now he wants me to come over to his place and see the stack of experimental models that didn't work which his company has built up at a rate it could pay for comfortably. I realize, of course, that it's not the models that didn't work he wants me to see, but what he and his helpers went through to build the one that does work. I'm going over to see the new gadget and the patent they got for it.

The way Bill explained it, licking the problem was as simple as rolling off a log when they actually got to it, and he can't understand why someone didn't think of it long ago. I must say, from what he said that it looks like a darned good idea, and I must get over there right away.

Ralph Jr., my son, and Gordy, another member of this inseparable trio, were with Bill on his latest visit to the Lee Hobby Foundry and listened while he brought me up to date on his latest developments. Ralph is running a little plant, and Gordy is doing fine in the construction field. Since I've watched these young people grow up, I feel very close to them and somewhat responsible for keeping their heads screwed on straight.

After Bill's recital, I couldn't resist the temptation to point out to the three how silly I think it is for any young man who's really trying to do his job to worry about the lack of opportunity it offers. I told the boys of the dozens of young men who have crossed my path who have become nothing but frustrated tramps looking for the ideal setup they think they need to achieve the particular brand of success they have their hearts set on.

Then I told them of others, afraid to quit, who work under a cloud all the time with one hand tied behind them because they see no future in the job they feel they're stuck with. I also told the boys of other unfortunate souls who would rather keep

(*Concluded on page* 144)

Lower Your Core Baking Costs with a DESPATCH VERTICAL OVEN

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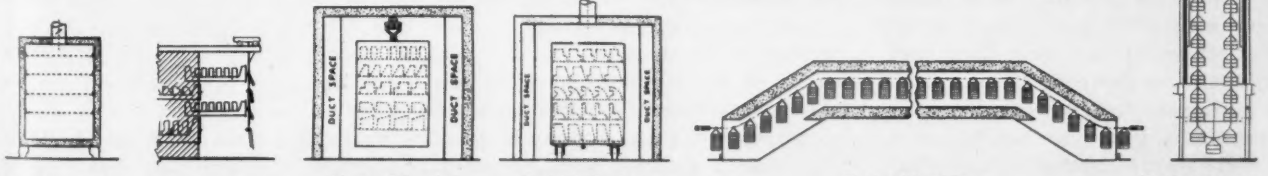

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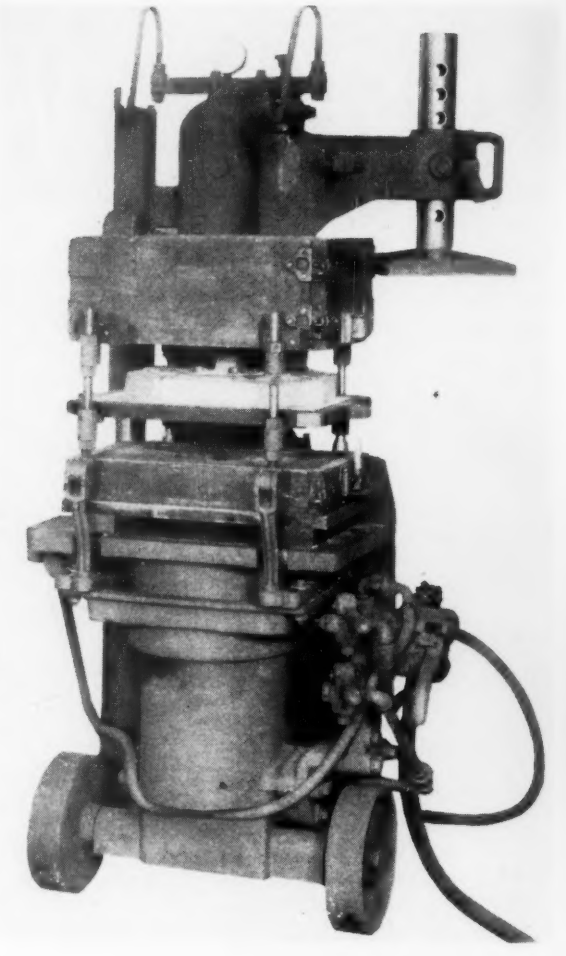
PIONEERS IN ENGINEERING HEAT APPLICATIONS FOR INDUSTRY

How To Do It . . .

Double Lift Device Assures Pattern Draw Accuracy

By L. D. PRIDMORE, president, International Molding Machine Co., La Grange Park, Ill.
as told to
ROBERT H. HERRMANN, associate editor, FOUNDRY



HERE IS a device that does a sure, accurate job of performing particularly difficult draws on matchplate pattern work. It is used on a jolt-squeeze pin lift machine. The lift pins are equipped with extensions on which lugs are mounted at properly spaced intervals.

The cope and drag are made in the conventional manner. When the pattern is drawn, the top set of lugs on the lift arms first lift off the cope, then the second set of lugs catch the matchplate and lift it off the drag. When the lift has been completed, the cope and matchplate are removed by hand, and cores, if required, are set in the drag, and the cope replaced to close the mold. The entire pattern drawing operation is an automatic, mechanical action, insuring a high percentage of accurate draws.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $10 for each idea submitted and published. Send a photo or drawing with your idea

(*Concluded from page* 142)

on making one flop after another, trying to be wonderful, than make an outstanding go of ordinary but very important work.

I hope that I didn't bore these young men as I got excited about telling them of my conviction that no job and no company, in any field, can be too small or too commonplace to prevent anyone who has the stuff in him from demonstrating what he's got and what his potentialities are. I added that even with a broom, a person can demonstrate the personal traits necessary to the achievement of high executive posts.

What I tried to say, I guess, was that no job can hold the right kind of a fellow down and that to my way of thinking it is impossible for anyone to take an interest in his work and to keep on trying to do his best without piling up credits in his reputation bank which sooner or later will pay off with the compound interest, no matter how discouraging his prospects may appear at the moment.

Since all this is true, I went on, I am convinced that no one can afford, no matter what job he has or how temporary he thinks it is, to spend pieces of his life working with one hand tied behind him while his mind wanders off to graze in greener fields. The older I get, the more frequently I find that it doesn't take WONDERFUL PEOPLE with WONDERFUL MEANS to do a WONDERFUL JOB. To the contrary, it's amazing to me what ordinary means highly successful people employ, under commonplace circumstances, to do their best work.

It just dawns on me that about the only reference to a foundry in this article concerns Bill's visit to mine. On the other hand, I imagine that a great many young people and some not so young have never gotten all they could have from the foundry business because they have never given it a chance. Even though I'm just an amateur working in just about as small a foundry as there is, I'm convinced that a foundry is just about as safe a place as any for a man to invest his time, thought and sweat. It's so good, in fact, that even with one hand tied behind him and his mind on the greener grass across the fence, a fellow can make a pretty good living in it.

But since most of us have to work at something, we might as well get into it for all we're worth and get out of it all it's worth. There's lots of room in the foundry business for folks who will do this, and work is a lot more fun that way. Unless a man can find a reason for living in his work, not just a means of earning a living, he isn't really alive.

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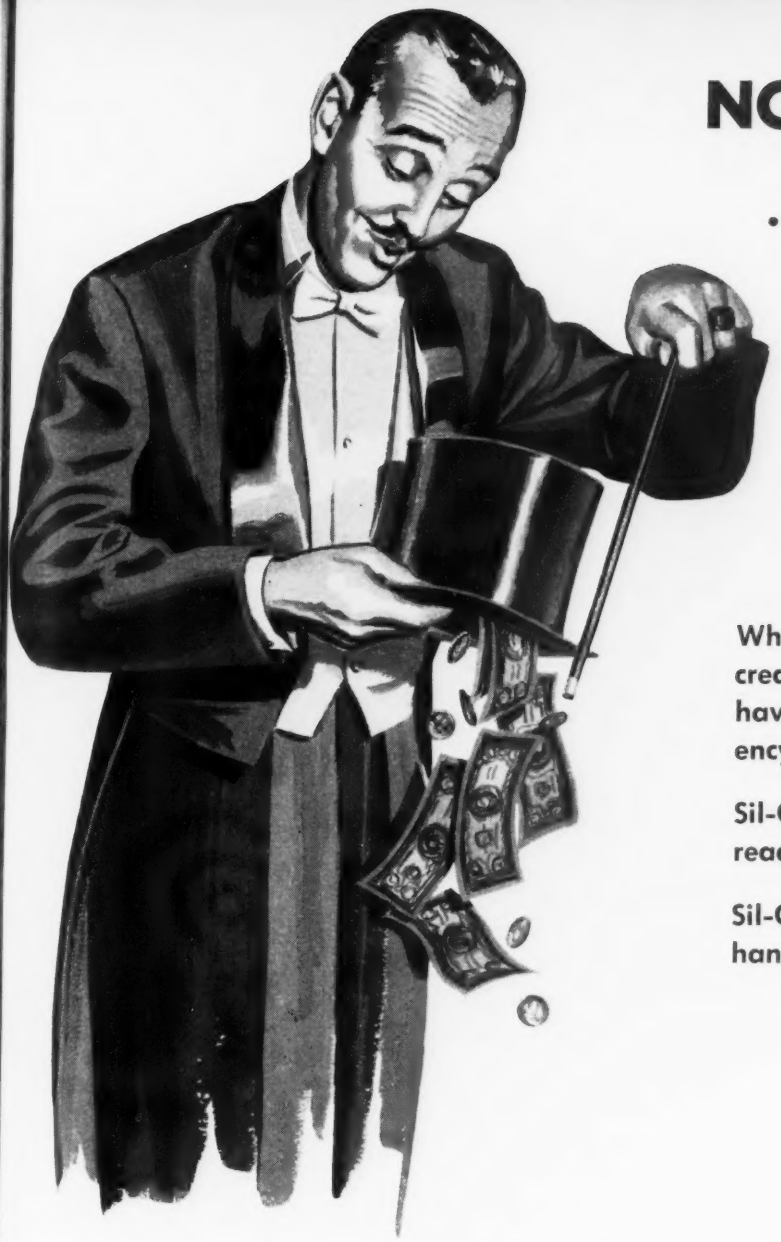

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By EDWIN BREMER

Foundry DEVELOPMENTS

RESULTS obtained in a study to determine "The Effect of Moisture on the Amount of Dust Produced by Foundry Sand," by J. Bright and F. M. Shaw as reported in the December, 1952 issue of the *Journal of Research and Development* (Birmingham, England), led to the following conclusions by the authors:

1. The moisture content at which dust evolution ceased was in the range 0.3 to 0.6 of the working range. The average cut-off point for both naturally bonded and synthetic sands was approximately 0.46 of the working moisture. It should be noted that to obtain the above ratios, the moisture at which even the smallest amount of dust became visible was used. In practice, the moisture could almost certainly be reduced by a further 25 per cent before dust would be evolved in any quantity. Consequently, it is probable that if any normal foundry sand contains a minimum of one-third of its working moisture evenly distributed (this is most important), it is unlikely to be a source of appreciable dust.

2. The addition of coal dust appeared to increase slightly the moisture required to suppress dusting.

3. No definite correlation was observed between the curves of green strength and dust generation for varying moisture contents.

* * *

TECHNICAL reports now available from the Library of Congress, Photoduplication Section, Washington 25, include "Grain Refinement in Aluminum-silicon (5 per cent Si) and Aluminum-silicon-magnesium (7 per cent Si, 0.3 per cent Mg) Casting Alloys," and "Measurement of Gas in Aluminum Melts." That on grain refinement is report PB 107603 and describes work carried on at the Naval Gun Factory, Washington, on the individual effects with regard to maximum refinement and refining efficiency of B, Be, Cb, Cr, Mo, Ta, Ti, W, and Zr upon the grain size of Al-Si casting alloys (Classes 2 and 3). Boron, Cb, Ti, Zr, Ta, Mo, W, Cr, and Be in that order of effectiveness refined the grain size of the alloys. Cost of the report is $1.75 on microfilm, and $2.50 on photostats. The report on measurement of gas is report PB 107511 and describes work at Frankford Arsenal, Philadelphia, to develop a simple and rapid technique. Method is to cast a test ingot in a small preheated mold and allow it to solidify under a controlled reduced pressure. Volume of precipitated gas in ingot is inversely proportional to the atmospheric pressure above it. Cost of the report on microfilm is $2.25, and $5 on photostats.

* * *

IN ATTEMPTING to obtain casting surfaces on brass and bronze which will polish and be chrome plated acceptably, some foundries find it helpful to use a coarse sand with a permeability of around 40. The as-cast surfaces are said to be nothing to look at, but on cutting down with polishing wheels, the metal seems to be sounder underneath the rough skin than is the case with smoother as-cast surfaces. The extra cost of cutting down is paid for by fewer rejects.

* * *

ACCORDING to an article by R. V. Riley and J. Dodd in the Nov. 13, 1952 issue of *Foundry Trade Journal* (London) excellent results have been obtained in gas welding nodular graphite castings by using rods of a similar structure which resulted in nodular graphite weld deposits. Welding rods used showed 3.4 per cent TC, 3.5 per cent Si, 0.02 per cent Mn, 0.01 per cent S, and 0.03 per cent P with 0.2 per cent Ce added to produce the desired nodular structure. It also is mentioned that Mg treatment likewise produces satisfactory rods. It was pointed out that base irons of high sulphur content, or those containing elements seriously harmful to the nodularizing additions, failed to give a completely nodular graphite weld deposit. However, borderline compositions would in varying degrees be suitable for welding with such rods to give strong nodular graphite cast iron weld deposits, and a range of rods of different chemical compositions could be developed to suit different grades of cast iron.

* * *

RECENT laboratory study by the National Bureau of Standards, Washington, proves for the first time that the rate of weight loss of a piece of steel corroding normally in soils can be measured electrically without actually weighing the metal. Conducted by W. J. Schwerdtfeger and O. N. McDorman of the NBS corrosion laboratory, the study gives further evidence that the electrochemical theory of corrosion applies generally to soils. Although the measurements were restricted to the laboratory, the success of the work suggests the possibility of valuable practical applications such as determination of the corrosion rate of a tank or other underground structure without the need for visual inspection.

* * *

CORE problem brought up at a recent nonferrous session concerned ½-in. cores made with urea formaldehyde resin binder baked dielectrically. Cores were quite hard when placed in the mold, but an hour later they could not be picked out without collapsing. Consensus was that the cores were not baked thoroughly despite their satisfactory appearance. Unless urea formaldehyde bonded cores are fully baked, they are definitely hygroscopic, and will draw moisture from the surrounding damp molding sand.

* * *

FREQUENTLY asked question relative to shell molding, according to one resin manufacturer, concerns the temperature range over which patterns can be operated successfully and the corresponding temperatures for curing of shells. This firm points out that ideally the cure of the sand mixture should proceed from both faces of the shell toward the center at equal rates. To accomplish this there must be a relation between pattern temperature and curing temperature, otherwise overcuring on one side and undercuring on the other will be encountered. If curing is being accomplished by radiant heat in the 1100 to 1400° F range, pattern temperatures as high as 600° are practical. Good working range would be 450 to 550° F. If curing is to be achieved in an oven at 700° F, a pattern temperature of less than 450° is recommended to avoid burning the pattern side of the shell by the time the shell is cured completely.

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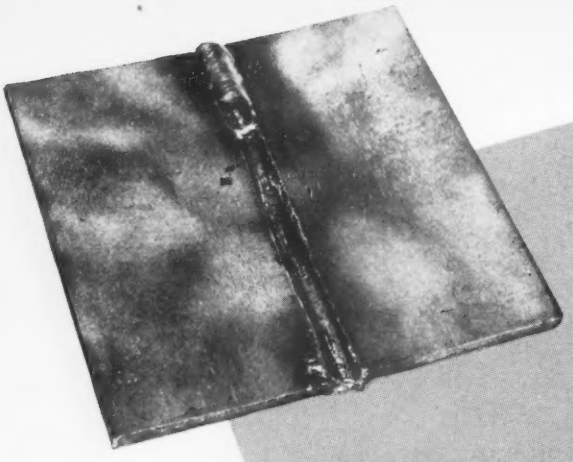

CASTING DESIGN Improved by WELDING

By ARTHUR L. PHILLIPS,
Eutectic Welding Alloys Corp.,
Flushing, N. Y.

Fig. 1—Free from oxidation or slag, surface of the chamfered, or gouged material makes a good base for future brazing or welding

CAST-WELD construction is a relatively new technique whereby the best features of casting are incorporated with the best features of welding. Neither method is a solution in itself, but when combined, each is complementary to the other. When the design of a large complicated steel casting is altered to permit it to be cast in two or more parts, many of the problems of foundry practice are eliminated. Then the parts are joined by welding, and the assembly will meet all specifications and greatly increase production.

Internal shrinkage in castings containing heavy and light sections has always presented a problem. Such shrinkage is due to the difference in thickness of the various sections of the casting and the more rapid cooling of one than the other, and to the difficulty in feeding the heavy sections. Therefore, it would appear probable that if the heavier sections were cast and welded to the lighter parts which had been cast separately, the shrinkage would be minimized. The economies to be gained through this method can be considerable, and much greater efficiency would be achieved by redesign. The weight could be reduced, the daily output of foundry molds increased; considerable reduction would be made in the cubic content of sand required for molds, and a great reduction in labor-handling cost would be effected.

Two new tools have been developed side by side with these new foundry techniques which make the welding of the castings an easier, stronger, and quicker operation. These tools are ChamferTrode and SteelTectic. With their use the interfaces can be prepared with rapidity, and the weld effected with despatch and high efficiency.

ChamferTrode is an oxygenless chamfering tool consisting of a steel electrode heavily coated with a special flux. Once the arc is struck

Fig. 2—Sprue, risers and flash are removed by chamfering rod which also chamfers sand holes and other flaws

the coating is reduced at a slower rate than the core, and this forms a tube through which the tremendous energy is concentrated. These characteristics enable a chamfer to be made with high precision. The arc protruding from this high-heat-resistant coating can thus be placed with certainty upon the exact spot where the grooving is to begin. The metal is literally blasted away, leaving a surface free from oxidation and slag which forms an ideal base for future welding operations. Once an arc is struck the flux coating becomes impregnated with tiny metallic particles which enable the electrode to be used as a contact electrode, and permit it to be placed precisely upon a predetermined spot by the welder with his shield raised. They also prevent the arc from becoming extinguished and eliminate weldfasts.

The electrode can be aligned with greater accuracy with the shield up, and the operator has time to lower his shield before the arc proper starts. The metallic impregnated flux when placed upon the metal, forms contact and emits a flicker of light; a few seconds later the arc starts, but this delayed action gives the operator time to lower his shield. In the foundry this tool is ideal for removing unwanted flash, risers, and sprues. Practically any spot can be reached and it is instantly available for chamfering, gouging, or the removal of unwanted metal.

An Eastern foundry milled out the cracks in its die-cast machine links which usually took half a day (set-up, milling, and machinist's time, etc.), and on top of this was the welder's time. With the new chamfering

(*Concluded on page* 151)

Fig. 3—Welding surfaces around the cracks in this oil impregnated, high alloy bronze casting were left clean by searing action of the new tool

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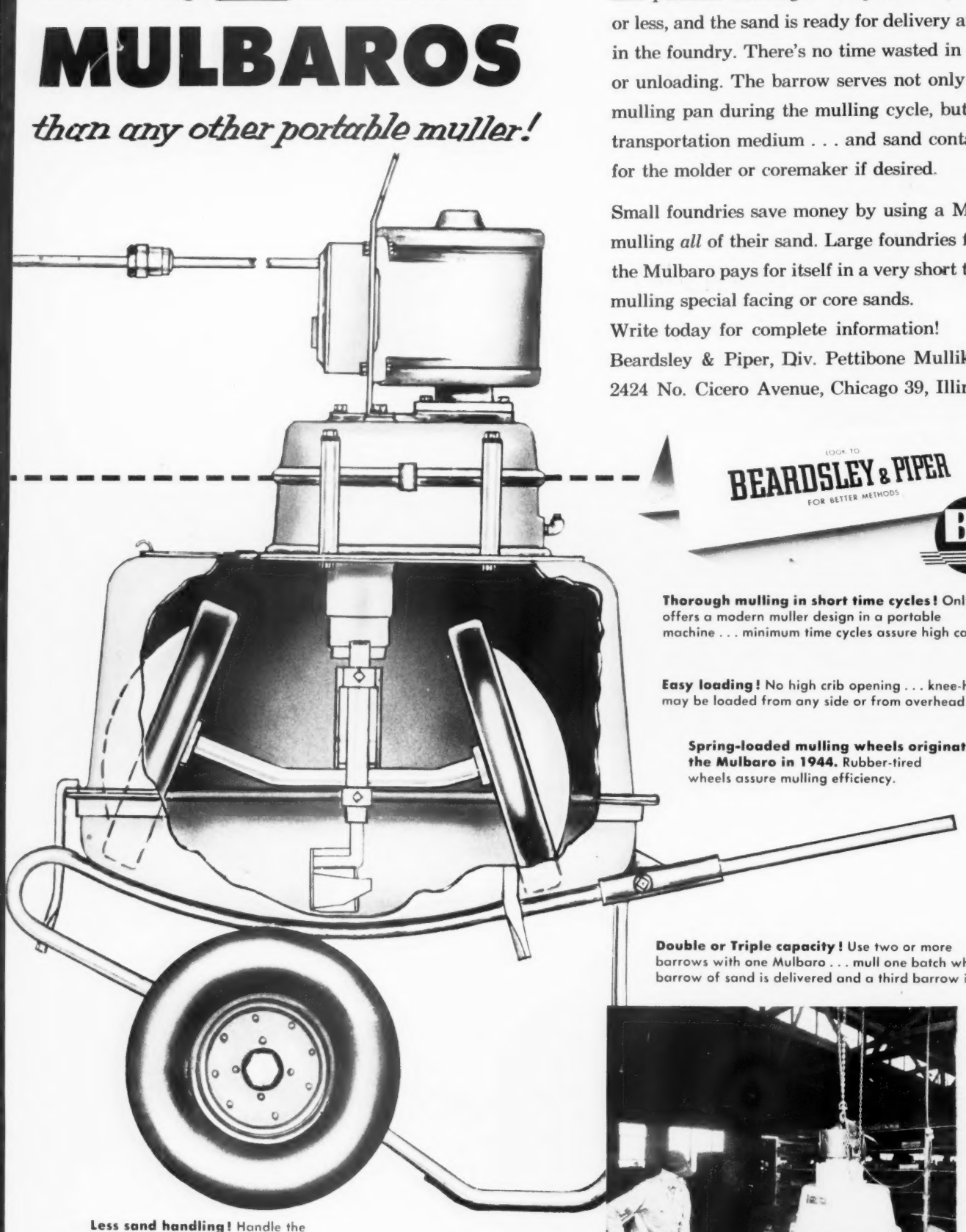

Once loaded, the Mulbaro's barrow is placed beneath the mulling mechanism which is then lowered into position. Mulling is completed in *four minutes* or less, and the sand is ready for delivery anywhere in the foundry. There's no time wasted in loading or unloading. The barrow serves not only as a mulling pan during the mulling cycle, but as the transportation medium . . . and sand container for the molder or coremaker if desired.

Small foundries save money by using a Mulbaro for mulling *all* of their sand. Large foundries find that the Mulbaro pays for itself in a very short time in mulling special facing or core sands.
Write today for complete information!
Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 No. Cicero Avenue, Chicago 39, Illinois.

LOOK TO
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FOR BETTER METHODS

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MEMBER FEMA

Thorough mulling in short time cycles! Only the Mulbaro offers a modern muller design in a portable machine . . . minimum time cycles assure high capacity.

Easy loading! No high crib opening . . . knee-high barrows may be loaded from any side or from overhead hopper.

Spring-loaded mulling wheels originated with the Mulbaro in 1944. Rubber-tired wheels assure mulling efficiency.

Double or Triple capacity! Use two or more barrows with one Mulbaro . . . mull one batch while a second barrow of sand is delivered and a third barrow is loaded.

Less sand handling! Handle the sand **once** when it's loaded for mulling . . . then deliver it to molder or coremaker in the same barrow.

Really portable! Move the sand . . . not the whole machine.

(*Concluded from page* 148)

device unwanted metal around the crack was removed swiftly, and during the entire operation the crack remained visible to the operator. No cleaning or grinding was necessary.

Then the cracks were welded with Steel Tectic. The entire operation, including welding, took 40 minutes.

The latter rod is a specially formulated electrode combining American Welding Society's 6010, 6011, and 6012, characteristics. Properties claimed are: Suitable for all position welding at low amperages; exceptionally good for poor fit work; pass over pass welding is possible without slag removal; beads can be applied right over previous welds without slag interference; high-strength porous-free bonds are obtained on dirty or rusty metal; danger of burn-through minimized owing to the low amperage used; rapid solidification permits vertical-down and overhead welding.

A much greater production can be achieved when tack-welding because no time is lost removing slag, and no difficulty is encountered in joining light to heavy gage metal.

The versatility of the electrode is due in part to the new high fluidity and sensitivity coating which disintegrated through the arc to give a gaseous atmosphere which insures a deposit free from oxides. The metal is deposited in the form of a spray, and the speed with which the deposit is made is directly related to the intensity of the current used. When it is used with a low-amperage, deposits are made with normal speed, but this can be increased to almost any desired speed by simply increasing the amperage.

Cast-weld construction presents few problems to the foundryman. He has the necessary welding equipment plus all the resources of the foundry—facilities no welding shop can hope to equal. The increase in welding knowledge has made cast-weld construction a practical possibility with nearly all types of metals. The new alloys with their high affinity for the metals they are to join have so simplified the task of the foundryman that cast-weld is now largely routine.

Book Review

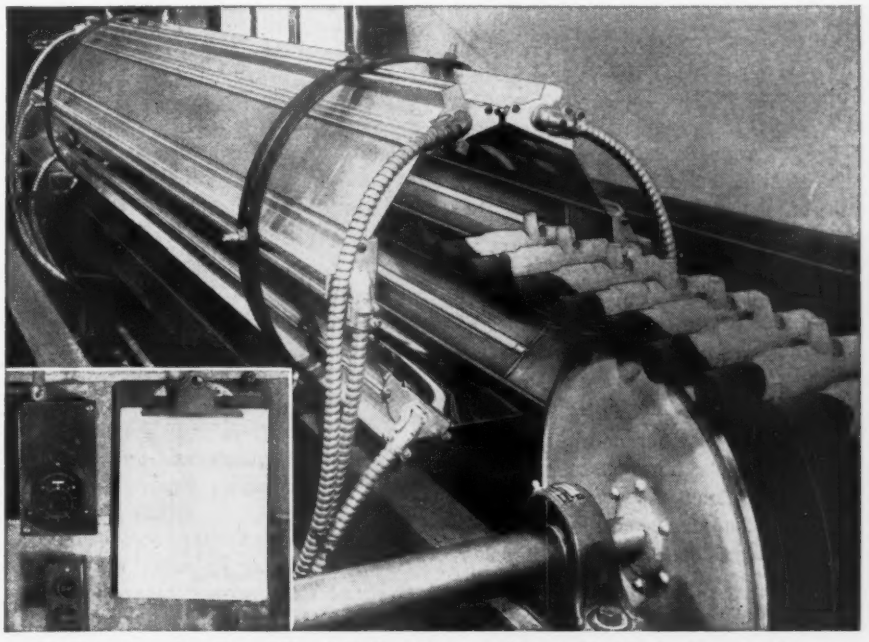
Fatigue and Fracture of Metals, edited by William C. Murray with a foreword by Jerome C. Hunsaker, cloth, 313 pages, 6 x 9 in., published jointly by the Technology Press of Massachusetts Institute of Technology, Cambridge, Mass., and John Wiley & Sons Inc., New York. Price $6.

The 14 papers which make up this book were presented by specialists in different aspects of fatigue and fracture of metals at a special conference on the subject at Massachusetts Institute of Technology in June, 1950.

The discussion included general experience with failure of metals, specific fields in which it occurs, internal mechanisms probably involved in fatigue damage, the significance of various metallurgical phenomena to fatigue, the potential usefulness of different research methods to disclose more about the mechanism itself and about ways of countering it in design and the direction of future research, as forecast by the speakers' specific recommendations.

Celebrates 50th Year

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y., specialist in overhead handling since 1903, will observe its 50th anniversary during 1953. To date, the firm has engineered, built and delivered 110,749 electric hoists and 25,157 electric traveling cranes.



Six Chromalox 3 kw. all-metal Electric Radiant Heaters making up this 6 ft. aluminum tunnel oven, provide wide-band infrared heat for uniform drying of sand cores used in manufacture of plumbing fixtures. Oven has quick warm-up, closely controlled, easily duplicated heat for any core size. Inset shown is input controller and production chart for recording time and temperature.

Electric Sand Core Oven Triples Drying Capacity

Milwaukee, Wisconsin—A unique, all metal infrared tunnel oven has tripled capacity for drying wash-dipped sand cores of a local manufacturer of brass plumbing fixtures. It also takes less floor space than the fuel-fired oven it replaced; has reduced handling, minimized breakage, and lowered operating costs.

The oven consists of a 6 ft. aluminum tunnel, 11″ in diameter, with six Chromalox 3 kw., rod-type electric radiant heaters clamped to circular shaped angle iron. Heaters radiate long wave length, unfiltered infrared heat that is absorbed with almost equal speed by all colors and surfaces; have 30-second percentage timers to closely control temperature and on-off heat cycles, and prevent burned or damp cores; provide oven temperatures up to 450°. Tunnel dries wash in two minutes; old oven required 10 to 15 minutes drying time. New oven can be turned off when not in use and brought up to temperature again in two minutes. Old oven required an hour warm-up. This latter difference alone reduced operating costs by $1.25 a day.

Cores are set on conveyor as dipped, carried through tunnel at 6 fpm, and conveyed 11′ beyond tunnel exit, where they are cool enough to handle. They were racked after dipping under old system, and dried in batches: by time rack was filled, wash had soaked into some of cores, and crumbing occurred.

The new setup occupies only 45 square feet at end of room. Old oven required 100 square feet in room center.

MORE INFORMATION

Further data on this and other efficient applications of Chromalox Electric Radiant Heaters is available without obligation by writing: EDWIN L. WIEGAND COMPANY, 7596 Thomas Blvd., Pittsburgh 8, Pa.

SB-24

CHROMALOX

Electric heat for modern industry

Are You Protected Against Loss of Customers' Patterns ?

AN INVESTIGATION of gray iron castings industry experience with loss of customers' patterns was conducted recently by the Terms and Conditions of Sale Committee of the Gray Iron Founders' Society.

In its report the committee felt it desirable, of course, to point out the importance of a foundry's being constantly on the alert as to its customers' terms, particularly in regard to possible liability for patterns, and of constant notification by a foundry to its customers that the foundry does not insure and assumes no liability for their patterns.

In addition, the committee discussed bailee's legal liability insurance, which now is carried by many leading foundries as protection against legal liability and baseless lawsuits. The committee feels that this matter is one of considerable importance and should be explored by individual foundries through discussions with their insurance and legal advisers.

What Can Happen—The committee cited recent instances where a foundry, generally through fire, lost customers' patterns in storage, and because of the lack of attention and/or consideration that the foundrymen had given to the matter of possible liability for customers' patterns, these foundries were faced with losses. They had to bear the cost of replacing the patterns, whereas if proper attention and consideration had been given the matter, they could have protected themselves against such a contingency.

If nothing in the contract between a foundry and its customer places a greater liability on the foundry, the foundryman is not responsible for loss or damage, by fire or otherwise, to patterns, unless the foundryman in the first instance is guilty of negligence or carelessness. The trouble is that it is so easy to find that one of the employees of the foundry has been negligent or careless that the risk of liability, if a fire breaks out, is quite high.

Here's What You Can Do

What are the avenues open to the foundryman for his own protection? To begin with, a foundry can put its customers on notice of the "Terms and Conditions of Sale," with special reference to the clause relating to loss or damage to patterns by fire. Generally recognized Terms and Conditions of Sale in the foundry industry run somewhat as follows:

"The seller is not responsible for loss of, or damage to, customers' equipment by fire or other casualties beyond his control.

"It shall be the obligation of the customer to cover his equipment with proper insurance. We do not insure customers' patterns."

These conditions can be printed on the reverse side of a foundry's letterhead, on its quotation forms and its acknowledgments and invoices. Some foundries also periodically communicate with customers, at least once each year, informing them of the pattern equipment belonging to the customer which the foundry has on hand, making certain that the customer knows that the foundry is not carrying insurance on the patterns, and informing the customer that the foundry is *not* responsible or liable for customers' pattern equipment other than the ordinary responsibility of a "bailee for hire."

Printed Forms — Some foundries also use a printed form when they first receive pattern equipment on an order. This form is often entitled "Notice of Receipt of Pattern Equipment," and states that the foundry does not carry insurance on customer equipment and that it holds the customers' patterns at the risk of the customer who supplied them.

Some foundries also prepare a form letter to be mailed to customers when patterns remain on the shelves for a certain period of time without a reorder. This frequently occurs since patterns are generally held by a foundry after an order has been completed to await future orders or instructions from the customer to return the patterns or send them elsewhere. The letter tactfully inquires whether in the opinion of the customer the patterns have become obsolete and, if so, requests instructions as to their disposal.

Remind the Customer—Since it is the foundry's duty to use ordinary care to protect the customer's equipment, it seems to be a sensible and advisable thing for a foundryman, under the circumstances, to communicate periodically with the customer, calling his attention to patterns still in storage, and urging him to make certain that his patterns are properly protected against fire and otherwise.

Very often, a customer in sending patterns to a foundry mails a memorandum invoice billing the foundry for the value of the patterns. This is also an opportunity used by some foundries to acknowledge receipt of the memorandum and to state that, while the foundry recognizes that there may be a special reason for billing the patterns in that fashion, the foundry wishes to inform the customer that since the property belongs to the customer, they should protect it by insurance, since the foundry will *not* be responsible for loss or damage to the property.

Customers can easily protect their patterns and other equipment by procuring from their insurance agent what is known as an "all risk" policy, or, better yet, a "floater policy." The floater policy protects him against loss from anything, whether fire,

(*Concluded on page* 155)

ROLLOVER
TYPE BT

BRITISH MOULDING MACHINES

World's New Standard of Comparison for

SPEED
ACCURACY
EASY OPERATION
LOW MAINTENANCE

Type BT5 in inverted position, ready for roll-off. Conveyor retracts automatically. Operator stays in one spot — the BT pivots right in front of him.

SPEED: 10-second machine cycle . . . jolt, simultaneous squeeze and rollover, and pattern draw. Capable of averaging 100 24x20 drags per hour. Four-second automatic mold removal.

ACCURACY: Within two thousandths of total draw.

LOW MAINTENANCE: Sincerely believed to be freer from maintenance troubles than any comparable machines in the world. Needs no attention other than lubrication. Husky, fool-proof jolt timers. Built-in air filters. Honed cylinders increase life 300%. Automatic lubrication to all points. Draw guide rods do not jolt up and down but are used only for pattern draw, increasing life 10 times.

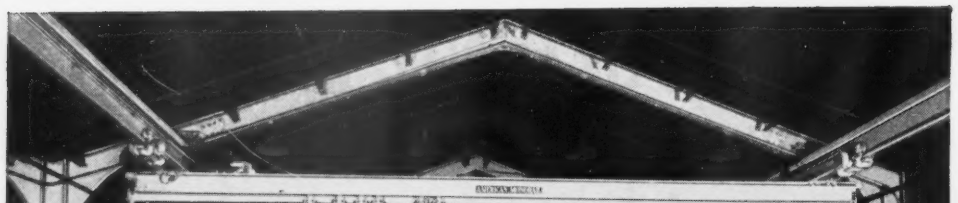
EASY TO OPERATE: Less operator motion—less fatigue. Controls require only fingertip pressure. Automatic roll-off.

CAPACITY: BT5, mold area 1000 sq. in.; BT1, 500 sq. in.

NOW USED IN 37 COUNTRIES—GUARANTEED TWO YEARS — WRITE TODAY FOR FURTHER INFORMATION.

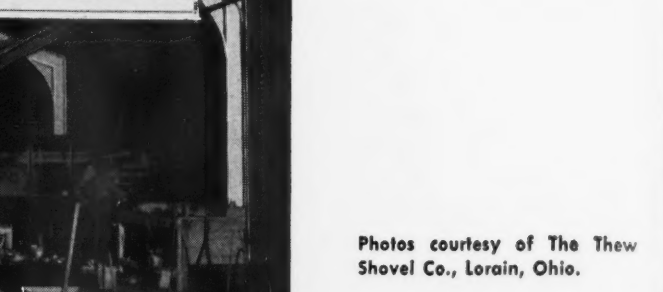
Represented in United States and Canada by:

STAMFORD ENGINEERING WORKS, 507 CANAL ST., STAMFORD, CONN.



Photos courtesy of The Thew Shovel Co., Lorain, Ohio.

Rigid frame structure by The Steelcraft Mfg. Co., Rossmoyne, Ohio.



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with flexible overhead crane service

Don't let crane requirements stymie your consideration of rigid frame buildings. Packaged buildings not only provide definite savings in construction costs and erection time but can be equipped with crane service over the entire area. American MonoRail cranes up to 5-ton capacity are available for entire span or half span operation. If you are planning plant expansion and considering rigid frame type construction, be sure to include American MonoRail cranes. Our engineers will gladly consult with you and show you cost and space saving advantages, in addition to original installation savings.

Write us today.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE CLEVELAND 7, OHIO

(*Concluded from page* 152)

theft, burglary, water damage, tornado, malicious damage, etc.

You're Not Off the Hook—Many foundrymen would assume that when a customer has been warned in this way, he would insure his property adequately, and that the existence of such insurance would eliminate the possibility of a claim against the foundryman. This is not so. In the event of loss the insurance company will not hesitate to bring a claim against the foundry for loss or damage to the patterns if there appears to be any evidence of negligence on the part of the foundry.

Despite this risk, the committee feels that it is unwise for a foundryman to assume responsibility for the loss of customers' patterns where he is not at fault or to insure the customers' patterns against loss or damage. Values change from day to day, and a foundryman cannot know the value of the other fellow's property. A foundry which insures its customers' property may be all right today, but when the loss happens tomorrow, the foundry may be involved with the other fellow's loss. Duplicate coverage sometimes develops and since there then is a question "which insurance contract will prevail" attempts to avoid legal problems by this kind of insurance often just create new ones.

Another Type of Insurance — The committee also suggested the desirability of considering the obtaining of bailee's legal liability insurance protection. Policies furnishing such protection are offered by leading insurance companies, and their cost is not high. These policies protect foundries against loss of patterns in cases where legal liability can properly be asserted against the foundry and, perhaps more importantly, offer protection against a large amount of legal fees and expenses that might develop in defending lawsuits on account of the loss of patterns or similar items.

The committee believes such insurance can be carried in an amount which is only a small proportion of the actual value of the patterns and, of course, it does not involve in any way co-insurance. This is regarded as a matter for the individual foundries and their insurance and legal advisers. However, the committee felt it would be derelict in its duty if it did not suggest to the individual foundries that they explore this matter, for many of the leading foundries today do carry this type of insurance.

All sizes graded to S.A.E. specifications

"Certified" Abrasives

clean more castings per dollar!

"Certified" Samson Shot and Angular Grit are made *extra-tough* by a special *automatically controlled* hardening process. They wear longer, can be used over and over again . . . actually clean more castings per dollar! Save money . . . switch to "Certified" Abrasives.

Experienced Foundrymen say:

Always specify "Certified"

ACCEPTED AND USED FOR OVER 55 YEARS

PITTSBURGH CRUSHED STEEL CO., Pittsburgh, Pa.

STEEL SHOT AND GRIT CO., Boston, Mass.

MEMBER FEMA

Industry BRIEFS

FERRO Machine & Foundry Inc., 3155 East 66th St., Cleveland 4, producer of gray iron castings, has purchased John Harsch Bronze & Foundry Co., 12502 Berea Rd., Cleveland. All management and employee personnel, including H. B. and Harry Harsch, the former operators, will continue with John Harsch Bronze & Foundry Co., which will not change its name or its methods of operation.

* * *

Monsanto Chemical Co., Springfield, Mass., has reorganized its sales department so that it now includes a section for industrial resins, the market for which has been expanding greatly in recent years. The sales manager of the new section will be Edmond S. Bauer Jr. of Springfield. Assistant sales manager will be David L. Dondy of Chicago.

* * *

Robinson Clay Product Co., Akron, O., has purchased all property and assets of Stowe-Fuller Refractories Co., which has plants at Alexandria, Pa., and Strasburg, O. Stowe-Fuller was dissolved as of Dec. 31, 1952. Robinson purchased a controlling interest in the company in 1936 and has managed it since then.

* * *

U. S. Reduction Co. has begun production in its East Chicago, Ind., plant of zinc die casting alloys produced in accordance with ASTM specifications. U. S. Reduction also produces aluminum, both in East Chicago and in Toledo, O.

* * *

Cleveland headquarters of John A. Sharritts & Co., representative for International Molding Machine Co., Modern Equipment Co. and Claude B. Schneible Co., have been moved to 2052 McKinley Ave., Lakewood 7, O.

* * *

Tri-State Foundry Co. has been organized at 4785 Morse St., Cincinnati, by Robert Webb, president-treasurer, and Ralph Miller, vice president - secretary. Messrs. Webb and Miller, formerly associated with Williamson Heater Co., acquired part of Williamson's molding equipment when the company discontinued foundry operations in Cincinnati. New company will produce gray iron and alloy castings on a jobbing basis as well as supply the Williamson firm which operates a plant in Greensburg, Ind.

* * *

Claud S. Gordon Co., 3000 South Wallace St., Chicago, has built a new manufacturing plant on a 6½-acre site in Richmond, Ill. The building contains 12,000 sq ft of floor space and will be devoted to the production of the company's line of thermocouples, pyrometer accessories, specialty instruments and metallurgical testing machines, including sand testing equipment.

* * *

Meehanite Metal Corp. recently purchased a building at 714 North Ave., New Rochelle, N. Y., and is now installed in it. In addition to complete offices for the company's staff, the new building includes enlarged laboratory facilities for experimental melting, chemical and physical testing and for photomicrographic studies.

* * *

United States Pipe & Foundry Co. has moved its general offices from East Burlington, N. J., to Birmingham. Headquarters of its subsidiary, United Concrete Pipe Co., will remain in Baldwin Park, Calif.

* * *

Steel City Testing Machines Inc. moved Jan. 1 from 8843 Livernois, Detroit, to a new plant at 8817 Lyndon Ave., Detroit 21. Capacity of the new installation is twice that of the old one.

* * *

Lebanon Steel Foundry, Lebanon, Pa., poured the first heats on Dec. 30 in one of the company's three new induction furnaces, two of which are of 2000-lb capacity, the other of 1000-lb capacity. Additional new equipment includes four centrifugal casting machines, two heat-treating furnaces, eight boring mills and a large radial drill press, all part of the firm's new die shop, which has a three-shift capacity of 200 tons of high alloy centrifugal steel castings per month. One shift is operating at present.

* * *

Michigan Steel Casting Co., 1999 Guoin St., Detroit, has sold its assets to Ebaloy Inc., Rockford, Ill., which also operates Crucible Steel Castings Co., Milwaukee. The sale involves only a change in ownership. Management and personnel will not be changed. Keith Kindred of Barcus-Kindred Co., Chicago, is the principal Ebaloy stockholder.

* * *

Liberty Foundry Co., 7600 Vulcan St., St. Louis 11, was largely destroyed by fire on Dec. 16. William T. Mellow, president, estimated damage to buildings at $225,000 and to equipment at $25,000. The blaze started in the core room, from causes unknown. Only two watchmen were on duty.

* * *

Dixie Foundry Co. Inc., King Edward Ave., Cleveland, Tenn., has changed its name to Dixie Products Inc. Founded in 1917 by S. B. Rymer Sr., the company is now operated by his sons, S. B. Rymer J president, and Leroy, Marvin a Robert Rymer.

* * *

Sightmaster Corp., 111 Cedar St., New Rochelle, N. Y., has appointed Merchant & Evans Co., 2019 Washington Ave., Philadelphia, as exclusive distributor in the Philadelphia area of the firm's product for welding and soldering aluminum and for dry bearings.

* * *

Interstate Machinery Co., Chicago, moved its Philadelphia warehouse and office on Jan. 1, 1953, from 2829 Broad St. to "A" and Venango Sts., Philadelphia 34. Frank J. Lunney is in charge of the Philadelphia branch.

* * *

Lufkin Foundry & Machine Co., Lufkin, Tex., has let a contract for construction of an additional office building and for reconditioning its present building.

* * *

Pennsylvania Glass Sand Corp. has moved from 2309 First National Bank Bldg., Pittsburgh, to 140 Stanwix St., Gateway Center, Pittsburgh 22.

* * *

Reynolds Metals Co., 2500 South Third St., Louisville, has appointed Nathan Trotter & Co., 36 North Front St., Philadelphia, distributor of aluminum pig and ingot to foundries in the Philadelphia area.

Sterling WHEELBARROWS for Your Foundry!

No. D4S — Tubular reinforced frame barrow for sand, scrap, etc. 4 cu. ft. capacity. 14 ga. tray.

No. D6S — Same as No. D4S above, but with 6 cu. ft. capacity, for coal and coke. 14 gauge tray.

Any Type of Wheelbarrow .... Now Available for PROMPT SHIPMENT!

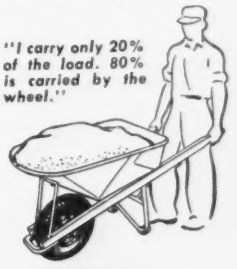
No. D8S — Tubular, reinforced frame barrow for coke, sawdust, shavings, and similar bulky materials. 14 ga. tray.

No. DF4S — Heavy duty barrow for extra hard foundry service. 3/16" plate supports front, back and bottom of tray. Tubular frame also reinforced. 14 gauge or 12 gauge tray.

Here's a simple way to solve your foundry hauling problems. Use Sterling Tubular Steel Handled Wheelbarrows or Barrows with wood handles made of select hardwood. They "fill the bill" . . . have long been known for their ability to withstand rough foundry usage . . . day after day . . . month after month. The all-welded Sterling tray is lapped at corners for double strength and is equipped with a continuous steel, butt-welded reinforcing rod around the top edge. And remember, Sterling Barrows are built by the same dependable manufacturer who has supplied you with Steel Foundry Flasks for almost a half century.

Choice of Wheels

Sterlings are available with Zero Pressure Cushion-type Wheel, Pneumatic-tired Wheel, or Plain Steel Wheel. All are interchangeable on any Sterling Barrow. Write for catalog.



"I carry only 20% of the load. 80% is carried by the wheel."

Consult Sterling when in need of foundry flasks or other foundry equipment.

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ONE ELECTRODE looks pretty much like another—until you try them.

Then you find out what each is really worth—and the results are not always encouraging. That's why we take nothing for granted here at IGE. We know our electrodes have every one of the features a top-quality electrode should have—controlled density, uniform structure, high mechanical strength, low electrical resistance. But we also want to know *how they work*—not on paper but *on the job.* So before we put any new-type IGE Electrode into production, we first put it into actual electric-furnace operation. We test it, we study it, we learn everything there is to know about its behavior. That way, we never have to go on appearance. We *know* IGE Electrodes produce higher tonnages. We *know* they last longer. And we know we can say, with perfect confidence: Specify IGE!

INTERNATIONAL GRAPHITE IGE & ELECTRODE DIVISION

SPEER CARBON COMPANY

St. Marys, Pennsylvania

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FEF Annual Meeting and Conference Planned

The sixth annual meeting and conference of the Foundry Educational Foundation will be held at the Hotel Cleveland, Cleveland, Wednesday and Thursday, Mar. 11-12. This conference is a joint event of the Technical Advisory Committee, University Advisory Committee and Industry Advisory Committee,s of the Foundry Educational Foundation.

The Wednesday evening dinner address will feature Dr. J. Elliott Janney speaking on the "Use and Abuse of Discipline". His presentation will discuss the benefits of, as well as the disadvantages encountered in the discipline developed in a young man through his family, education and environment and their relation to his development in industry.

Will Provide Guide

Wednesday morning will be devoted to an interpretation of the need, value and use of engineering talent in the foundry industry and will be directed, not only to university personnel, but to industry men as a guide.

Wednesday afternoon will be devoted to discussion of the recruiting and training of engineering graduates. This session will provide recommended procedures and offer illustrations covering the successful recruiting and indoctrination of the young engineer into the foundry industry.

Thursday will be devoted entirely to university foundry laboratory and lecture developments. This session will feature a summary of experiences with miniature cupolas which are used considerably as an instruction aid in university laboratories. Another feature will present a panel on the developing of interest among student engineers in the foundation program.

For the first time the annual meeting of the Foundry Educational Foundation will be held in conjunction with this conference. It is scheduled for 4 p. m. Wednesday. President Marion J. Allen will chart the future development of the foundation and its program as a part of his report.

Previous conferences have stressed the University side of the program almost exclusively. Interest will be divided this year with the industry although the subject matter will be interesting both ways. Members of the foundry industry interested in engineering education and its application are cordially invited to attend this affair.

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FINE - COARSE - MEDIUM
Dry or Sticky Materials

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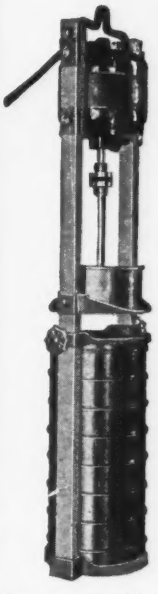
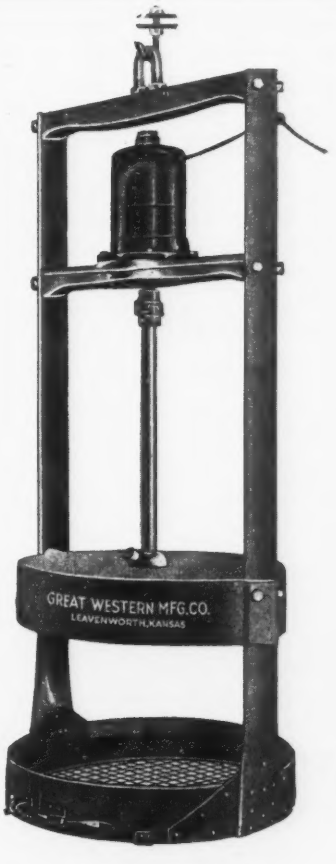
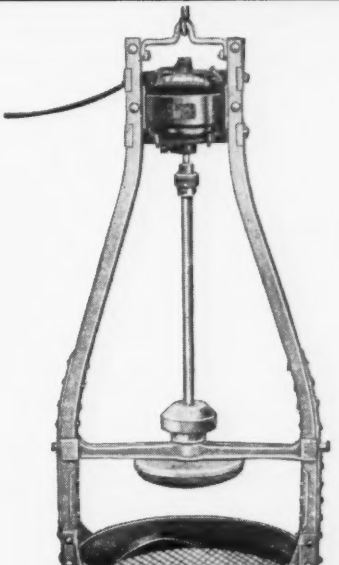


Type "HL" Lab Sifter for sand control $202.00 without sieves

Type "CS" with 24" square screen and automatic discharge $320.00.



Type "CR" with 24" sieve $310.00



Type "V"
With 20" sieve $250.00
Also made with 36" sieve $450.00

All these machines cost less than 1c an hour for power. Quickly removable steel rim sieves can be removed, emptied and replaced in seconds. Saves up to 97% of your labor costs. Send for free descriptive folder.

Prompt Delivery From Your Foundry Supply House

GREAT WESTERN MFG. CO.

Leavenworth, Kansas

By MARION J. ALLEN
Director, Personnel & Public Relations
American Steel Foundries
Chicago

Foundry Educational Foundation Program Achieving

ENGINEERING EDUCATION OBJECTIVE

This discussion of the progress and objectives of the Foundry Educational Foundation is from a talk presented before the St. Louis Chapter of the AFS. Mr. Allen is president of the FEF

WE MIGHT logically ask ourselves, "Who is the Foundry Educational Foundation?" Actually, it is the foundrymen, manufacturers of equipment and suppliers, engineering professors and instructors, student engineers, young men in the foundry industry, and the people in our founding members societies. In the foundryman and instructor group about 300 men are serving as trustees, instructors, committee members and fund raisers who are continually pacing the progress of the foundation. There are hundreds of foundry and allied industry firms whose consistent support has made possible the foundation's remarkable record to date.

Actually, we might say that the foundation represents a mental breakthrough of the reborn foundry industry. We are the result of a desire to do something about a problem. The problem simply stated is this: Up to 1942 the foundry industry was losing ground.

Just as there are many ways among foundries of making a given casting, so there are many ways of interpreting the job of the foundation from its written objectives. The stature of the foundry industry today in the engineering colleges of the country is due to the manner in which the trustees have guided our activities. For example, here are a few, but not all, of the attitudes and activities stressed the last five years:

1. We endeavored to insure the interest and whole-hearted co-operation of university officials which was accomplished through initial gifts of equipment, providing scholarships to insure students for the courses, the activities of our advisory committees and visits to the universities by our staff and other foundry personnel.

2. We sought to interest students in our industry, and again the scholarship and advisory committees as well as the interest and friendship of engineering professors and instructors, played an important part. In addition, a program of summer and permanent job placement and contact proved to be an important factor, and the increasing attractiveness of college foundry laboratories cannot be discounted. Plant visits and the opportunity to discuss their problems with foundrymen undoubtedly created high interest.

3. The refinement of current foundry courses and the establishment of high level engineering courses in foundry technology were promoted primarily by the intervisiting and discussion of the educators themselves. To facilitate this matter the foundation has anually held a conference made up of the Technical Advisory Committee and the University Advisory Committee. The former is made up of the technical directors of the founding member societies and the latter by the key professors in each of the universities.

4. We have provided avenues of information and data for use by educators which reflect the recommendations for both industry and the universities as to the conduct and progress of the program. Again the TAC-UAC Conference is one of these avenues. Many of the professors have had summer work with foundries either for the purpose of learning more thoroughly the foundry process or for research and development work on specific problems. A handbook of the data and information available to date is being published for distribution to university personnel. This will include not only the foundation schools but also about four dozen other engineering colleges as well.

5. We have insured continual uni

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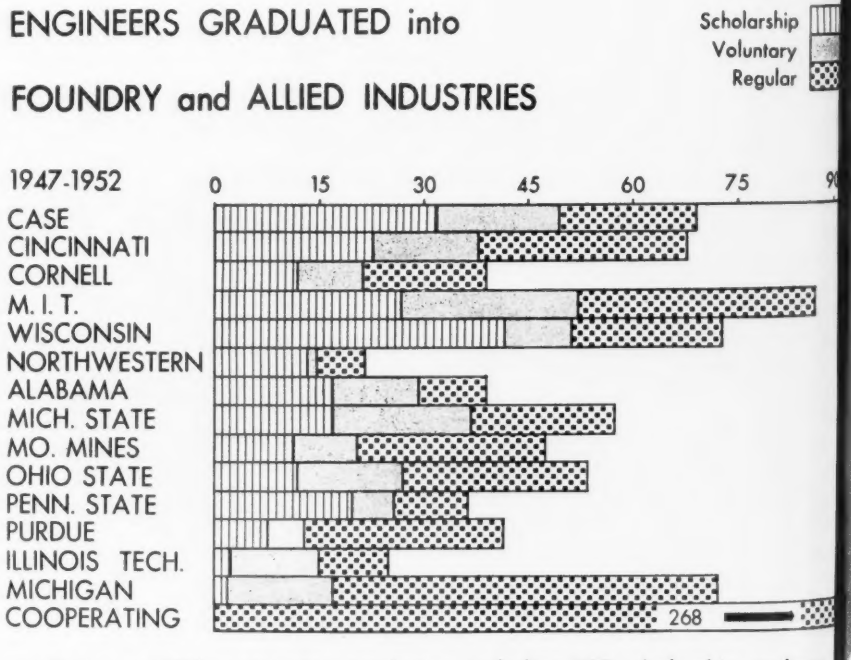
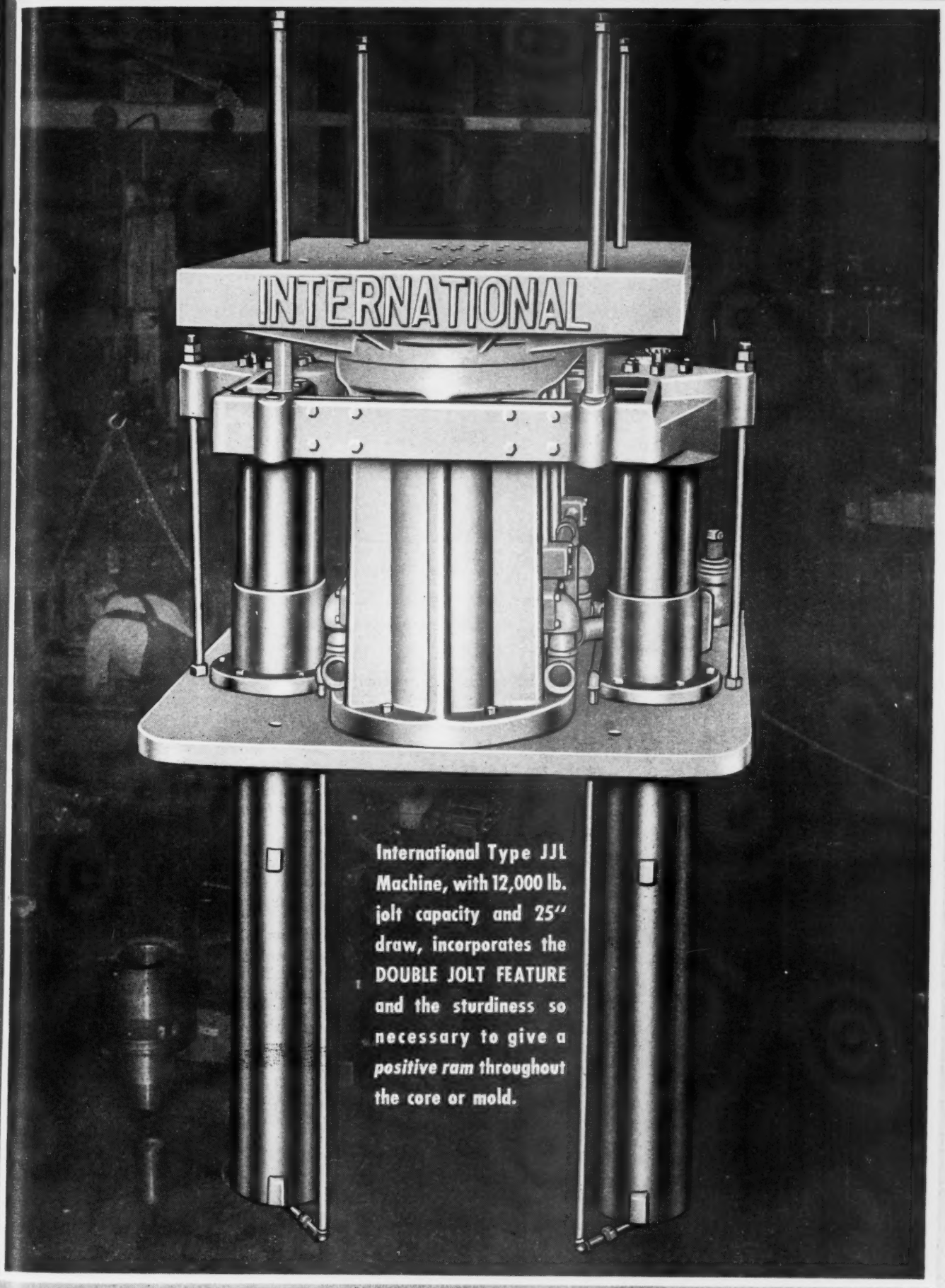


In five years 990 engineering graduates, including 229 scholarship students, from FEF and co-operating schools entered the foundry and allied industries

INTERNATIONAL TYPE JJL DOUBLE JOLT MACHINE



International Type JJL Machine, with 12,000 lb. jolt capacity and 25" draw, incorporates the DOUBLE JOLT FEATURE and the sturdiness so necessary to give a *positive ram* throughout the core or mold.

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La Grange Park, Illinois

HERE'S NEWS ON CRUCIBLE FURNACES

Making news today is this ring/cement lining developed by CARBORUNDUM for non-ferrous crucible furnaces. It consists of CARBOFRAX silicon carbide rings, 1½" thick, backed up with 2½", or more, of ALFRAX aluminum oxide cement (used for insulation). Operators say that this lining . . .

GOES IN FASTER. Rings are light enough for one man to handle. No hoist is needed. The cement is handled like Portland cement — just mix with water and pour. A full lining can be installed in a couple of hours over a week-end, and be ready to go Monday.

LASTS LONGER. CARBOFRAX rings make one of the most durable linings known. They are inherently resistant to flame erosion, spalling and cracking, and will go many months with little or no patching. Even really high temperatures won't soften them.

CUTS FUEL COSTS. Since the rings are only 1½" thick, there's ample space left for insulation. Moreover, the ALFRAX cement that backs up the rings is one of the best refractory insulating materials available. It provides a low heat capacity furnace and keeps heat loss to a minimum — hence less fuel is needed to turn out more melts.

GIVES EXTRA HEATS. You'll get fast, uniform heating with these linings, and *consistent* time per heat. One extra heat per day, sometimes two, is quite possible.

Why not check up? It takes just a moment to drop us a line. We'll gladly furnish recommendations to fit your needs. We make lining materials — rings, ring segments, and cements — to fit *every* need. Address Dept. A-23, Refractories Division, The Carborundum Co., Perth Amboy, N. J.

Use furnace linings by

CARBORUNDUM

Trade Mark

for lower cost installation . . . operation . . . maintenance

"Carborundum", "Alfrax", and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Co.

(*Continued from page* 160)

versity interest through the attention and help of men in our industry serving on industry advisory committees. Each university has such a committee.

6. We have continuously sought the guidance of university personnel through our University Advisory Committee as to our relations with schools. We do know that their counsel has enabled us to avoid some of the pitfalls which have been encountered by many industries who have sought to enlist university assistance. As a result, the foundation has perhaps made three times the progress which an ill-advised approach might have generated. We doubt, too, whether the industry could lead the development of course material and university relations as well as the professors and instructors have done by leading each other.

7. We have sought to establish and maintain friendly acquaintanceship with other engineering colleges with an eye to the voluntary development of their own foundry offerings and as possible foundation schools if, as, and when expansion into certain areas appears desirable. It was this policy that led to the expansion of our original five universities to six, then to seven, then to twelve, and this past year to fourteen.

We want to repeat that the progress to date could not humanly be accomplished by any one or two persons. The results today are the net product of the unselfish efforts of the 300 men mentioned previously.

The continuation, refinement and progress of the foundation will depend upon the active interest of a growing number of foundrymen in the intelligent use of the tool created for the industry's benefit. This tool not only creates talent for our own industry and establishes a growing number of pre-indoctrinated cus-

PROGRESS REPORT AVAILABLE

A statistical report on progress of the FEF the last five years has been prepared in the form of a 16-mm sound film, and is available for showing before interested groups. It may be obtained from the Foundry Educational Foundation, Terminal Tower, Cleveland 13. The report details facilities, courses and faculties at FEF schools and other data pertinent to the foundation's activities.

THE WORLD OVER

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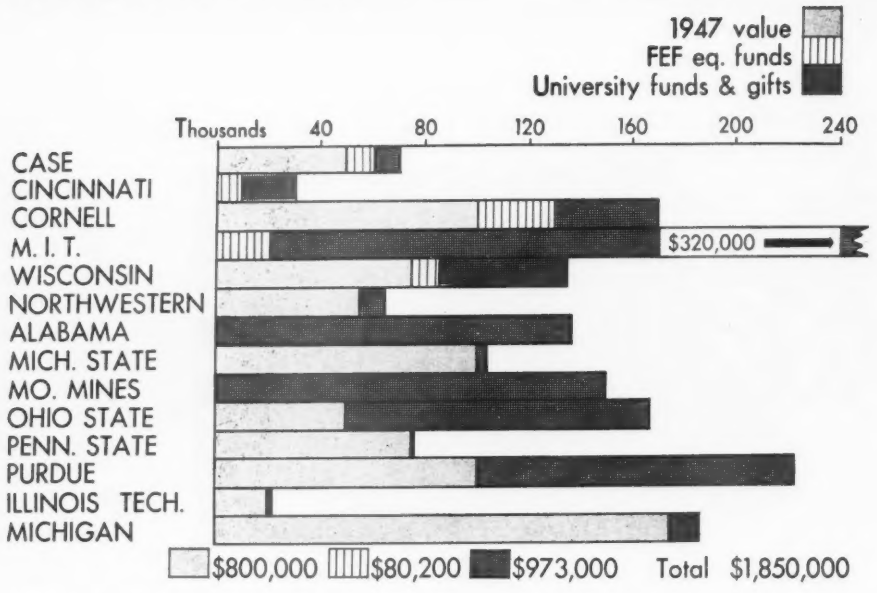


FEF schools have invested over $1 million in foundry laboratory facilities since 1947. Only a small part of this money was supplied by the foundation

tomers, but it also offers a wealth of talent in the universities for research, development and consulting activities by individual foundry firms. While these universities cannot act as consultants on all of the techniques involved in making a casting, there is valuable scientific and engineering knowledge on tap in these schools for problems in the use, design, specification and production of cast products.

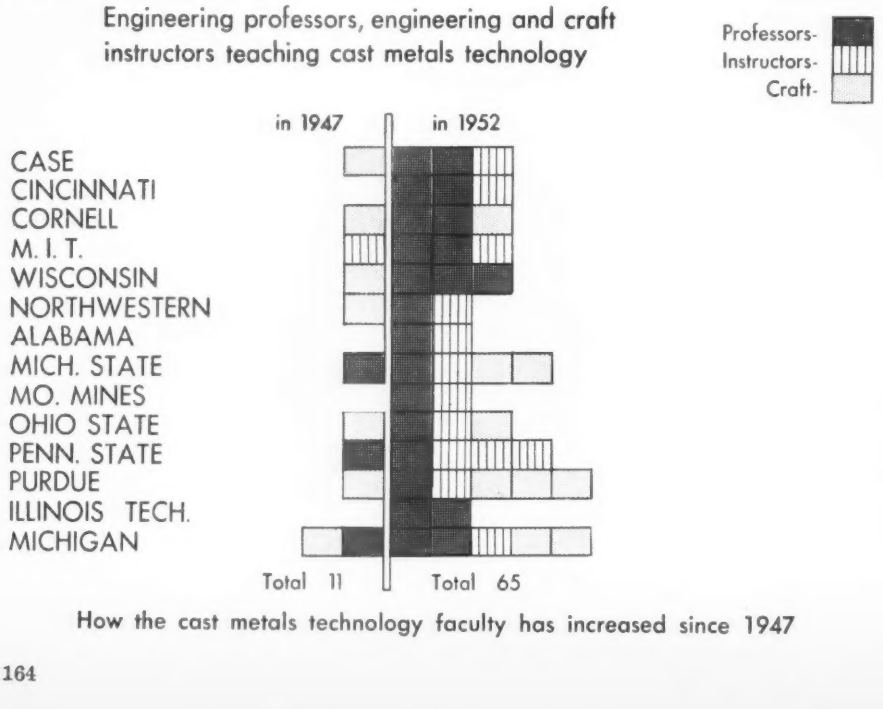
In its conduct of the program the foundation necessarily has to resist some pressures. For example, expansion of the program into an area depends upon the support the area can supply as well as upon the acceptance the program will have among foundries of the area. It is not essential that the support and acceptance be tailor-made, but the avenues by which these can be achieved should at least be open. The foundation, today, is gaining in acceptance not only from the support viewpoint but also from the understanding of its use as a tool by individual foundry executives and staff.

There is constant pressure from some sources to interfere with the conduct of the program in individual universities even to the extent of having industrymen select the scholarships. These we have resisted as we have felt that the men in the universities know best the character, personality and potentiality of their students. At times there have been firms who offer support providing definite numbers of graduates can be guaranteed to them, which, of course, we cannot do.

There is even pressure from some universities which believe that they could be of service to our industry by training young engineers for export to other parts of the country. Experience seems to indicate, however, that even though a young man may leave his home area in the initial stages of his career, he eventually returns. Most of the shifting in jobs among the foundry career graduates has been in that direction. We have become more firmly convinced that the foundation program must not only be supported financially by industry in that area but also that the graduates should be absorbed locally, wherever possible, and the school or schools in the area should be used as technical service centers in the form of research, development and consulting activity.

FOUNDRY FACULTY

Engineering professors, engineering and craft instructors teaching cast metals technology



How the cast metals technology faculty has increased since 1947

Consider Present Problems

Here are some of the current problems of the Foundry Educational Foundation. We realize that the foundation's present structure and the support from the foundry and allied industries have created a tool. The budget of the foundation may be regarded as the maintenance of that tool, but by no means should our industry make the mistake of assuming that the tool will run itself. We consider that they will help feed students into the program as well as absorb them and, beyond that, to help maintain as well as develop the very fine foundry faculty established the last five years. Our present tasks, therefore, line up as follows:

1. To populate the foundry courses.
2. To maintain the foundry faculty.
3. To recruit and use engineering talent.
4. To maintain contributions in support of the foundation's budget.

The foundry courses we must help populate are those in the upper level. Students are in short supply, and a university can present a course only when there is a sufficient number of students to justify the expense.

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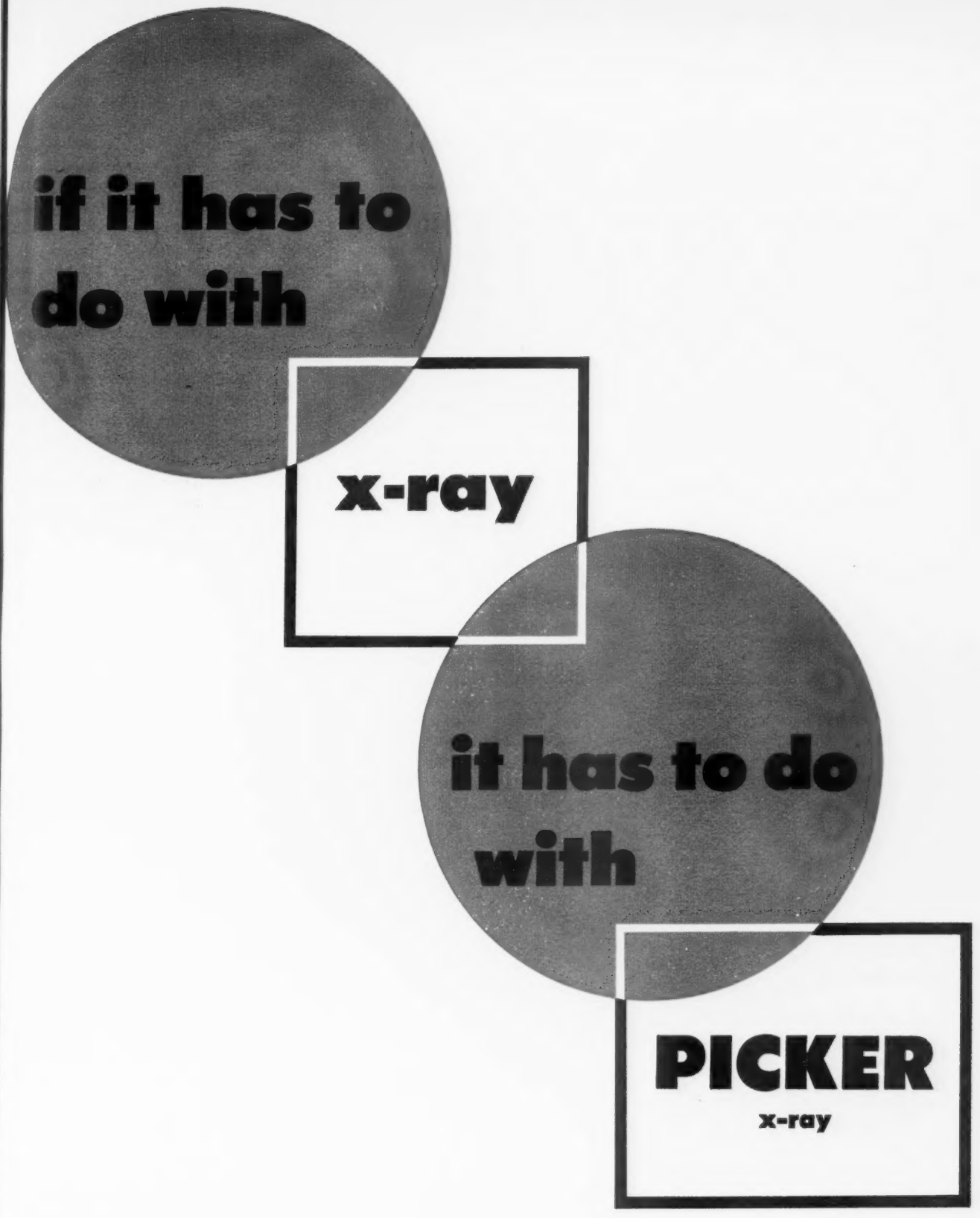

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SALES OFFICES AND SERVICE DEPOTS IN PRINCIPAL CITIES OF U.S.A. AND CANADA

(*Continued from page* 164)

One way in which each individual foundryman or, for that matter, local foundry organizations can assist is to supplement the foundation scholarships with local or company scholarships. These can be awarded to apprentices, to young men in their plants who are qualified to enter college, or to graduates of local high schools. An example is at the University of Alabama where five apprentices in that area entered the university last fall. During the past two years they have also had several young men from their plants return for both undergraduate and graduate study.

The Dayton Malleable Iron Co. has had a local scholarship program functioning in Ironton, O., for several years and will maintain the scholarships as long as the student remains in good standing. Naturally, these boys are inclined to join the Dayton Malleable organization upon graduation. The Foundry Educational Foundation expects to establish a plan whereby such programs can be funneled through the foundation office but bear the name of the company or the individual they designate. "We believe some firms will want to honor some of their past personnel in this manner. Such scholarships would be established in the school designated by the donor and the recipients would be selected by the company in cooperation with secondary school authorities.

Maintain Foundry Faculty

The second problem, that of maintaining the foundry faculty, would be partially served by populating the foundry courses. Beyond this, however, we must face the cold fact that a good professor or instructor finds it difficult to live on the salary that comes through pure teaching activity. They must supplement their income with research, consulting and development work. The manner in which this is handled depends upon the policy of the individual colleges; nevertheless, most of the professors and instructors in the foundation schools are supplementing their income in this manner.

Some very valuable contributions have been made to the technology of the cast metals process by these men the last five years, both in general as well as for specific companies. In fact, more than one-quarter of the technical papers presented at the 1952 International Foundry Congress were prepared by student and faculty personnel in the foundation schools. The increasing use of these abilities will lead to even more rapid development of the scientific and technical aspects of cast metals. We might add that the program has generated foundry instructors out of its students, and this too will increase.

At several universities the facilities of the program are available to the schools of education for training industrial arts teachers in sec-

(*Continued on page* 168)

Foundry Industry Included In Career Carnival

THROUGH co-operation of the four Michigan chapters of the American Foundrymen's Society and the Foundry Educational Foundation, the cast metals industry was represented at the fourth annual Career Carnival at Michigan State College, East Lansing, Mich., in November. Firms from 88 other industries, the Armed Forces and social services also participated in the carnival, which is staged to introduce college students and prospective college students to industry and to help them direct their educational programs to concrete goals. The two-day affair drew 10,000.

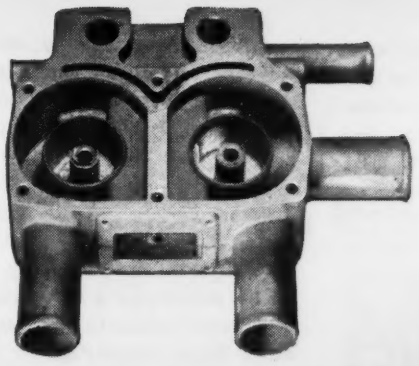
The foundry industry display booth was designed to depict the carnival spirit and to attract students in order to show them the importance, functions and opportunities of the cast metals industry. It was the only booth which represented an entire industry. Michigan chapters of the AFS financed the project, and students of the college chapter did the construction.

Various displays showed the variety of types of trained personnel the foundry industry requires and the opportunity that exists for such persons. Displays were constructed by students James Ogilvy, Ernest Frens, Ashley Sinnett, Louis Bachinski and Claridon Thomas.

H. Charles Esgar, FEF, Cleveland, and Paul Olson, Eaton Mfg. Co., Saginaw, Mich., were in the booth most of the time, and they were aided by Russell Brandt, Engineering Castings Inc., Marshall, Mich.; James McDonald, Central Foundry Division, General Motors Corp., Saginaw; Russell Peters, Eaton Mfg. Co.; Kenneth Priestley, Vassar Electroloy Products Inc., Vassar, Mich.; Prof. C. C. Sigerfoos, Michigan State College, and students Robert Grace, Bruce Harding, Mr. Frens, Mr. Sinnett, Mr. Bachinski and Mr. Thomas. Visitors were given FEF publications and a program of the student chapter's activities for the remainder of the term.

The foundry industry had been unrepresented at previous carnivals, but early last spring the Michigan State College Advisory Committee of the FEF decided that the cast metals industry should take part in this year's event. Committee members are Mr. Olson, chairman; Mr. Esgar; Prof. Sigerfoos; Mr. Frens, president, Michigan State College Student Chapter; Ross Shaffer, Lakey Foundry Corp., Muskegon, Mich., and David Boyd, Engineering Castings Inc.

From left to right, Russell Brandt, Engineering Castings Inc., H. Charles Esgar, FEF, and Bruce Harding, student, examine a display showing areas of industry where castings are fundamental for successful operation



This heart must pulse or the Plane's in trouble—

Radiograph of de-icer pump casting

so it's checked by RADIOGRAPHY

ICE can down a plane as sure as flak. So it's kept from wing-edge and prop by the throbs of this pulsating heart.

Easy to see the importance of this tiny unit—and why its castings must be sound. To make certain, each part is x-rayed. This way weakness cannot lurk in a hidden flaw.

What's more—a part so finely finished calls for careful machining, which would be wasted if x-rays did not first reject any unsatisfactory castings.

It's another example of why more and more suppliers of castings use radiography. It speeds the establishment of proper casting technics and lets you be sure only sound castings are delivered.

If you'd like to know how radiography can improve your operations, get in touch with your x-ray dealer. Or, if you like, write us for a free copy of "Radiography as a Foundry Tool."

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Radiography...
another important function of photography

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(*Continued from page* 166)

ondary schools. Several universities have given short courses, conducted seminars, and offered night school programs. The encouragement and support of all of these are just other ways of maintaining this faculty as well as aiding the men in our industry. It is our belief that while universities are like everyone else and are perfectly amenable to receiving gifts, they are, nevertheless, more than willing to work for the support they get. The point is that you can support them by giving them work to do.

To the third problem—recruiting and use of engineering talent—the foundation expects to devote considerable attention the next year or two. A seller's market in graduating engineers will exist throughout the decade, present trends indicate. This makes recruiting by our industry important in getting these young men into our plants. Unfortunately, as an industry, we have never developed a recruiting ability that could compete with some of the other large industries.

A few foundries are doing a very good recruiting job, but we must place in the hands of even the small foundry some recommendations as to techniques and methods of selling their opportunities to young men. The individual foundry executive must always realize that he is recruiting an unfinished product and that further training in technology as well as development of personality and character is an absolute necessity.

You must go to the universities and see these young men. That results can be achieved is attested to by the fact that the roster of companies which these young men join includes both small and large firms. If plant visits are to follow, the firm must pay the expenses of the student.

Build Up the Team

We like to think of this activity in terms of building up a baseball team. A big league team is not created by accepting the players who walk in the front door. The team management seeks players to fit their particular needs as well as the particular kind of team they are running. I would recommend reading the article by J. Elliott Janney entitled "The Personality of a Business Team," first given at the Foundation's TAC-UAC Conference at Cleveland, Feb. 15-16, 1951, and later published in FOUNDRY, September, 1951.

Here are some of the writer's experiences in recruiting and training since the extreme shortage of engineers. We realized early that the company must be sold to them, and that this can best be done by "across the table" conversation. We compiled a recruiting booklet to describe the company's products, plant locations etc. The company representative cannot tell the full story; the boy cannot ask all the questions which come to mind, and he probably forgets to ask some important questions while in the presence of the interviewer. The company booklet was prepared

(*Concluded on page* 170)

CALIFORNIA FOUNDRY CONFERENCE

To Study Recent Industry Developments

NORTHERN California Chapter of the American Foundrymen's Society has completed arrangements for a California Regional Foundry Conference to be held on Friday and Saturday, Feb. 6-7 at the Claremont Hotel, Berkeley, Calif. Well known speakers from large industrial sections of the country are scheduled to address the group on management and technical subjects, including latest developments in the foundry industry.

There will be a management luncheon and a dinner, preceded by a fellowship hour, on Friday and a buffet luncheon on Saturday. The management luncheon will open the conference. Collins L. Carter, president, Albion Malleable Iron Co., Albion, Mich., and national AFS vice president, and William W. Maloney, secretary-treasurer, AFS, will speak at that luncheon.

Chapter Chairman George Stewart, East Bay Brass Foundry, Richmond, Calif., has appointed Andrew Ondreyco, General Metals Corp., Oakland, to be conference chairman; William Gibbons, Ridge Foundry, San Leandro, Calif., to head the technical committee, and John Bermingham, E. F. Houghton & Co., San Francisco, to be in charge of arrangements.

The program follows:

Friday, Feb. 6

10 a.m.—Registration, main lobby, Claremont Hotel.

12:15 p.m.—Management Luncheon, Emerald Room.
Speakers: Collins L. Carter, president, Albion Malleable Iron Co., Albion, Mich., vice president, AFS, and William W. Maloney, AFS secretary-treasurer, Chicago.

3 p.m.—Costing, Emerald Room.
"Practical Survey of Sound Costing Applicable to Most Foundries—Iron—Steel—Nonferrous"
Speaker: Earl Paltenghi, H. C. Macaulay Foundry Co., Berkeley, Calif.

6 to 6:45 p.m.—Fellowship Hour.
Refreshments—Host: Columbia Geneva Steel Division, U. S. Steel Corp.

6:45 p.m.—Dinner, Salem Room.

8:15 p.m.—Shell Molding, Salem Room.
"Practical Analysis of Sand Mixes—Mold and Pattern Design—Mold Making—Pouring"
Speaker: A. L. Goodreau, American Brass & Aluminum Foundry, Los Angeles.

Saturday, Feb. 7

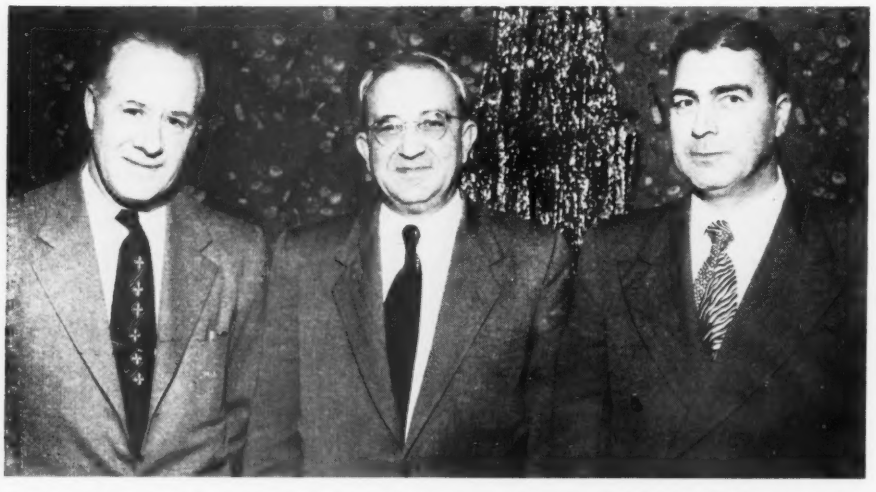
9 a.m.—Gating and Risering—Salem Room
"Exploring Principles of Gating and Risering as Applied to Steel Castings."
Speaker: Arnold K. Steger, Hanford Foundry Co., San Bernardino, Calif.

10:30 a.m.—Basic Lined Cupola—Salem Room.
"Evaluation of Acid and Basic Linings—Operating Costs—Present Day Applications—Future Possibilities."
Speaker: Sam F. Carter, American Cast Iron Pipe Co., Birmingham.

12:15 p.m.—Buffet Luncheon—Sun Deck.

1:30 p.m.—Mineral Perlite—Salem Room.
"Application in Making of Molds and Cores—for Steel—Iron—Nonferrous."
Speaker: Harold R. Wolfer, Puget Sound Naval Shipyard, Bremerton, Washington.

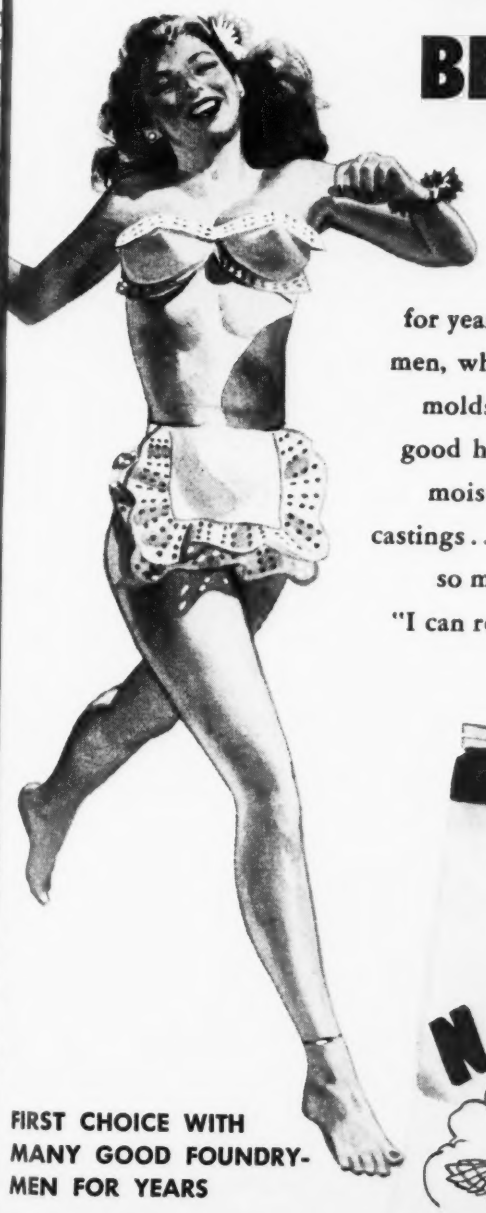
3 p.m.—Sands—Salem Room.
"Properties and Applications—Molding Sands—Core Sands—New Sand Developments."
Speaker: Harry W. Dietert, H. W. Dietert Co., Detroit.



Conference committeemen, left to right, are: William Gibbons, Ridge Foundry, San Leandro, Calif., technical section chairman; Andrew Ondreyco, General Metals Corp., Oakland, Calif., general chairman, and John Bermingham, E. F. Houghton & Co., San Francisco, chairman of the meeting's arrangements section

. . . you can always FIGURE on finer castings with better bonded molds— using top quality

NATIONAL BENTONITE



Consistently high quality National Bentonite has been figured on regularly for years by many expert foundrymen, who demand better molds—molds with high green strength, good hot strength, and minimum moisture content for finer-finish castings . . . fewer rejects. That's why so many good foundrymen say, "I can rely on National Bentonite."

FIRST CHOICE WITH MANY GOOD FOUNDRYMEN FOR YEARS

Quick Service From Better Foundry Suppliers Everywhere

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MEASURE BY WEIGHT INSTEAD OF VOLUME...

Two important variables to the success of good foundry molding are frequently overlooked . . . proper mixing and proportioning of mold, facing and core sand.

Large amounts of sand and small percentages of other materials make up the sand mix. Some additions are as low as one percent, to add certain physical properties to mold or core sands. Slight changes in proportioning can change the mold characteristics entirely. That's why measuring is so important.

Measuring is done many ways . . . by shovels, gallons, quarts, cubic feet, wheelbarrow . . . or by weight. Needed volumes may vary considerably, depending on the moisture of the sands.

With sand put into the muller, it's time to add other ingredients for a skillfully worked out mix. So Mr. Mixer measures out quarts or gallons of bentonite in a nice clean gallon measure, bumping it between dips in the sack to get, at last, a nice heaping measure . . . perhaps a gallon and a quarter. Multiply this error five or six times and see what it does to proportions. Surprising, too, how many pounds a gallon of bentonite, or any dry binder, will weigh when measured by different operators.

To properly add dry binders, use a scale. It's surprising how closely mixes follow a set pattern when everything is weighed accurately. Time consumed weighing is far less than measuring too, and far less costly, counting failures turned into successes.

7900

(*Concluded from page* 168)

to fill in the gaps, to be read and studied at the student's leisure.

These booklets are mailed well in advance of an interview to be put on display in the placement office at the university, and are also sent to individual professors who have students in foundry courses. Along with the booklets we send application forms when the school requests them, but in most instances the schools furnish a personnel history for use in interviewing. Of course, as does everyone, we want the cream of the crop—a boy who has intelligence, maturity, motivation, drive, reliability, enthusiasm, poise, initiative, ability and leadership—but, like most companies in recent years, if the boy has expressed a preference for our kind of work, we take a chance on him and pay his expenses to the plant where he is needed, for an interview. We use engineers in all phases of our business but have the greatest difficulty in finding engineers who are interested in sales work. Often the young engineer discovers he wants sales work after he has been in the plant in some other phase of our operation, and vice versa.

We have formalized training programs for engineers in sales, design, test and development and for accountants in the accounting phase. In production the engineer is recognized as a trainee, and in most plants we refer to the program as on-the-job training. The objective at the plant is to teach the trainee the functions of the departments and how the various jobs are done.

In general, we do not attempt to make a skilled workman or technician of the trainee on any single job through this training period. Generally, he doesn't know the phase of production in which he is interested, and we don't know where he will fit until we have had an opportunity to observe him. However, for him to learn the various functions and relationships it is necessary for him to do the actual work. Only in the case of sales trainees do we use the trainee as an observer, and that usually is because of union rules or because he will be at a particular plant for only a limited time.

We have found that the foreman, or middle management, can perform a most valuable function in helping the trainee along. The trainee wants someone to advise him and answer his questions.

I have only highspotted the recruiting and training activity, but I do want to stress the importance of going after these boys, because they won't come to you. You may have to make more than one trip to the university to talk with the same boy. I have many times, especially if he had what I wanted.

I must admit to a sense of personal pride in the accomplishments of the foundation which I know is shared by all of the other trustees who have helped guide and support the program. Somewhere within the metals casting industries during the past ten years a spark of greatness came to life, and we in the foundation feel that we are a reflection of this inner urge within the industry itself. This spark came from the self-made and hard hitting foundryman of the past generation, and it is to their everlasting credit that they were intelligent and broad enough to look toward engineering education as one of the means of satisfying this drive.

WISCONSIN REGIONAL CONFERENCE

To Be Held in Milwaukee Feb. 12-13

WISCONSIN Chapter of the American Foundrymen's Society and the University of Wisconsin will sponsor the sixteenth annual Regional Foundry Conference on Thursday and Friday, Feb. 12-13, at Hotel Schroeder, Milwaukee.

A program of 20 separate technical sessions has been prepared. In addition, a general meeting will open the conference. At that meeting, the opening speaker will be I. R. Wagner, national president of the AFS. There will be luncheon sessions both days and a banquet Thursday evening.

Simultaneous technical sessions covering steel, gray iron, malleable iron, nonferrous and pattern making will be held Thursday afternoon and Friday morning and afternoon.

The program follows:

Thursday, Feb. 12

9 a.m. — Registration, fourth floor Hotel Schroeder.

10-10:40 a.m.—Welcoming Addresses: I. R. Wagner, Electric Steel Castings Co., Indianapolis, national AFS president; Dean M. O. Withey, College of Engineering, University of Wisconsin.

10:40-11.50 a.m. — General Meeting: "Their Health Is Our Business," Walter F. Scholtz, Allis-Chalmers Mfg. Co., Milwaukee.

12 noon—Luncheon Meeting — "How's Your Sense of Humor?" Edward McFaul, Chicago.

2:15-3:45 p.m.—

Steel: "Strain Theory of Hot Tearing," William S. Pellini, Naval Research Laboratory, Washington.

Gray Iron: "Foolproof Sand Works for a Wide Range of Castings," J. S. Schumacher, Hill & Griffith Co., Cincinnati.

Malleable Iron—"How To Get More Production with Controlled Sand," Frank S. Brewster, Harry W. Dietert Co., Detroit.

Nonferrous: "Fracture Test of Melt Quality," George P. Halliwell, H. Kramer & Co., Chicago.

Pattern: "Pattern Equipment as it Affects Foundry Equipment," J. W. Costello, American Hoist & Derrick Co., St. Paul.

4-5:30 p.m.—

Steel: "Evaluation of Core Sand Binders," Clyde Wyman, chief metallurgist; Charles Fuerst, research metallurgist; and George Di Sylvestro, foundry technician, Burnside Steel Foundry Co., Chicago.

Gray Iron: "How Iron and Steel Melts in the Cupola," Daniel Krause, Gray Iron Research Institute, Columbus, O.

Malleable Iron: "Snagging at Its Best," Russell L. King, Bay State Abrasive Products Co., Chicago.

Nonferrous: "Sand — Synthetic, Natural, Semi-Synthetic," George Anselman, Beloit Foundry Co., Beloit, Wis.

Pattern: "Design of Coreboxes and Driers for Coreblowing," E. Blake, Cleveland.

6:30 p.m.—Banquet, Crystal Ballroom—"Business and Industry in an Atomic Age," Henry Pildner, Cleveland.

Friday, Feb. 13

10-11:50 a.m.—

Steel: "Good Casting Design on Purpose, or What Is Product Development?" William T. Bean Jr., Industrial Electronics Inc., Detroit.

Gray Iron: "Fluidity Testing of Gray Cast Iron," Phil C. Rosenthal, professor of mining and metallurgy, University of Wisconsin.

Malleable Iron: "Shell Molding and Equipment," Richard Herold, Borden Co., New York.

Nonferrous: "Effect of Gating Design on Casting Quality," Walter Bonsack, Christiansen Corp., Chicago.

Pattern: "Industry Looks at Apprenticeship Training," R. G. Greiner, Training Department, Allis-Chalmers Mfg. Co., Milwaukee.

12 noon—Luncheon Meeting: "Your American Foundryman," Herbert Scobie, editor, *American Foundryman.* "The First Five Years of the Foundry Educational Foundation," George K. Dreher, executive Director, FEF.

2:30-4 p.m.—

Steel: "Material Handling in the Cleaning Room," Duane Bosma, Bucyrus-Erie Co., South Milwaukee, Wis.

Gray Iron: "Casting Defects as Related to Sand Practice," Thomas Barlow, International Mineral & Chemical Corp., Chicago.

Malleable Iron: "Principles of Control of Chemistry and Related Properties in Malleable Irons," Prof. Richard Heine, University of Wisconsin.

Nonferrous: "Information Forum," George P. Halliwell, H. Kramer & Co., Chicago; George Anselman, Beloit Foundry Co., Beloit, Wis.; Walter Bonsack, Christiansen Corp., Chicago, and Carl Van Buren, Allis-Chalmers Mfg. Co., Milwaukee.

Pattern: "New Development in Pattern Practice," James Mathias, Accurate Match Plate Co., Chicago.

Industrial Management Proceedings Are Ready

The Industrial Management Society, 35 East Wacker Drive, Chicago 1, has made available the *Proceedings* of the 16th Annual Time and Motion Study and Management Clinic, which the society sponsored Nov. 5-7 at the Sheraton Hotel, Chicago.

The publication includes 168 pages of charts, forms, illustrations, complete transcripts of talks by leaders of labor, management and government on such topics as time study, motion economy, methods, plant layout, materials handling, wage incentives, maintenance and human relations.

This material has been published by the society and is available for $4 at the address above.

A view of Cleveland's famous Terminal Tower, taken from the Cuyahoga River which winds through this rich industrial area.

cleveland

foundry market area number two

More than 30,000 people are employed in the Cleveland area's 222 foundries, where approximately a million tons of castings are produced annually. These totals will increase considerably as Ford's new foundry and other expansions reach full production. This area enjoys a good diversification of foundries, including many important jobbing foundries. A wide variety of products are cast, from practically every type of metal. Many of Cleveland's gray iron foundries are using ANNEALSHOT and/or SUPER-ANNEALSHOT to keep their cleaning costs to a minimum. For information and prices on these efficient and economical abrasives, write to METAL BLAST, Inc., 872 East 67th Street, Cleveland 3, Ohio.

ANNEALSHOT
chilled shot and grit
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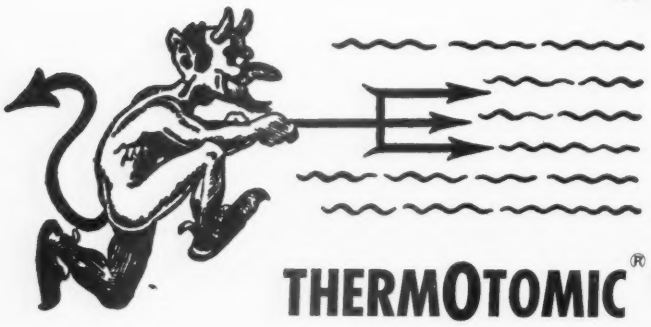
malleable shot and grit

GUARANTEE: If you don't find Metal Blast abrasives the best and most economical you've ever used—you may return the unused quantity for refund, at our expense.

CLEVELAND PLAIN DEALER PHOTO

Produce More Castings Per Heat

with



Soffel's

THERMOTOMIC® "HOTOP" LIQUIDIZER

Exothermic Carbon Free Liquidizer For Iron, Steel, Nodular Iron

This new head compound saves feeding metal in risers or feeding heads which can now be reduced in height 40 to 70%

SOFFEL'S THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER is different from other head compounds in that HOTOP LIQUIDIZER does NOT contain powdered metal, is NOT a thermit compound. It is a patented exothermic compound entirely free of carbon, sulfur and phosphorous and can be used without danger of contamination on any ferrous metal or alloy.

HOTOP LIQUIDIZER also saves molding time as less sand is needed in the mold cope due to short height of risers. HOTOP LIQUIDIZER produces a liquid slag well over 4000° F. of heat and insulates the metal. The feeding metal will remain liquid at least 50% longer assuring adequate feeding while the casting cools and solidifies. Piping and shrink cavities caused by premature freezing of the feeding metal are eliminated.

GUARANTEED TO PRODUCE SOLID CLEAN CASTINGS

SOFFEL'S FAMOUS CARBON FREE LIQUIDIZER FOR ALL METALS and ALLOYS

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on both ferrous and non-ferrous metals and also in ingot production. It is the original scientific non-carbon, exothermic compound for feeding heads and risers.

When applied on the heads or risers CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. It actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding heads will be eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft refractory insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads or risers.

SOFFEL'S THERMOTOMIC COMPOUND

PATENTED

FOR ALL METALS and ALLOYS

THERMOTOMIC COMPOUND is a patented Exothermic compound that can be molded into any desired shapes and used as feeding ring inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with 1½" feeder openings. This permits easy removal of the casting feeding heads and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing mixed with molding sand in the mold, heat at thin metal sections is retained until the thick main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength. For use in green sand molds, use THERMOTOMIC W. P. (Waterproofed)

NOTE: SOFFEL'S CARBON FREE LIQUIDIZER NO. 5 is recommended for use on top of feeding heads in conjunction with THERMOTOMIC COMPOUND. For aluminum castings, use THERMOTOMIC ABC and AL-X31 LIQUIDIZER. When ordering a trial sample, advise the kind of metal to be used on.

U. S. Patents No. 2,490,327 and No. 2,500,097

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Buick Continues Mechanization of Foundry Operations

By HERBERT CHASE

IN line with its policy to make foundry operations less tiring as well as to do individual jobs better, the Buick Motor Division, General Motors Corp., has added recently to some of its foundry equipment, operating devices of considerable merit. In one case cited here, operations formerly done by hand are now performed by air-operated plungers and, in the other, automatic timers control cycling of a molding machine.

In a jolt-squeeze strip molding machine with flask rolloff (Fig. 1), for example, the head now is moved horizontally by a plunger operating in an air cylinder shown at the top center of the illustration. Formerly, the head was shifted manually. This change saves manual labor and time and, in some cases, makes it possible to double up on patterns so that the output per flask is double that attained before. Molds for smaller automotive parts such as cylinder heads, manifolds, etc., are made on these machines.

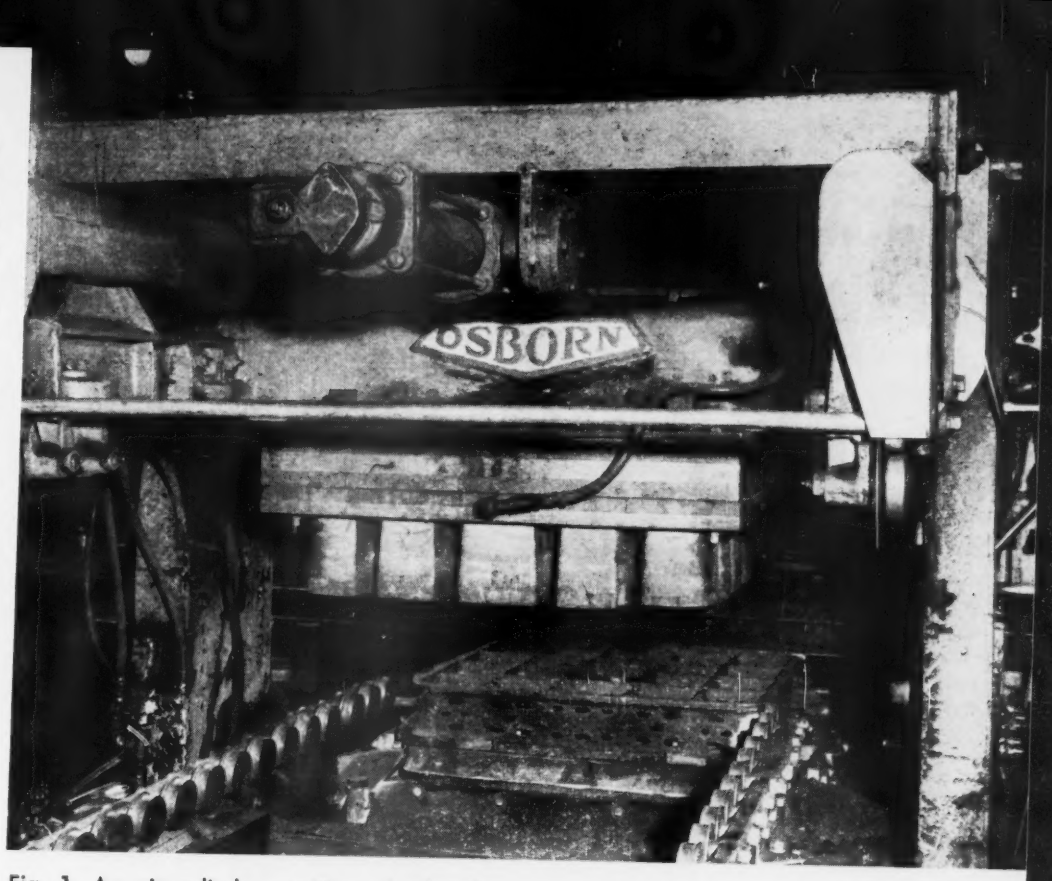

Fig. 1—An air cylinder positions the head on jolt-squeeze strip molding machine work

Regulate Number of Volts

In the case of larger, heavier molding machines of the type described above (Fig. 2) an automatic timer setup has been added to regulate the number of jolts and the time for the squeeze and the draw. All the operator does after setting a cope or drag in place and opening a sand chute to fill the mold, is to press a button that starts the cycle of the machine. This results in a certain predetermined number of jolts, to distribute and help pack the sand, followed by a squeeze, for a specified number of seconds, and then by a draw that also is timed for optimum results. Cylinder block molds are produced on these machines.

Before adding the timers it was possible, if too few jolts were used or, if too few seconds were allowed for the squeeze, to produce molds not up to standard—with the possibility that castings were unsatisfactory and had to be scrapped or repaired. With the timers, each mold is identical and takes the same time to produce, so that average casting quality is improved. In short, the timers help to avoid human errors or mistakes in judgment or carelessness, and insure superior results.

Only two cases favoring greater mechanization are cited here. Many others have been put into effect and others are planned. Enough has been accomplished, however, to show that properly developed mechanization pays off not only in higher output of good castings but in better average casting quality at lower costs per ton of castings produced.

Fig. 2—Automatic timer cycles mold-making operations on the larger, heavier machines

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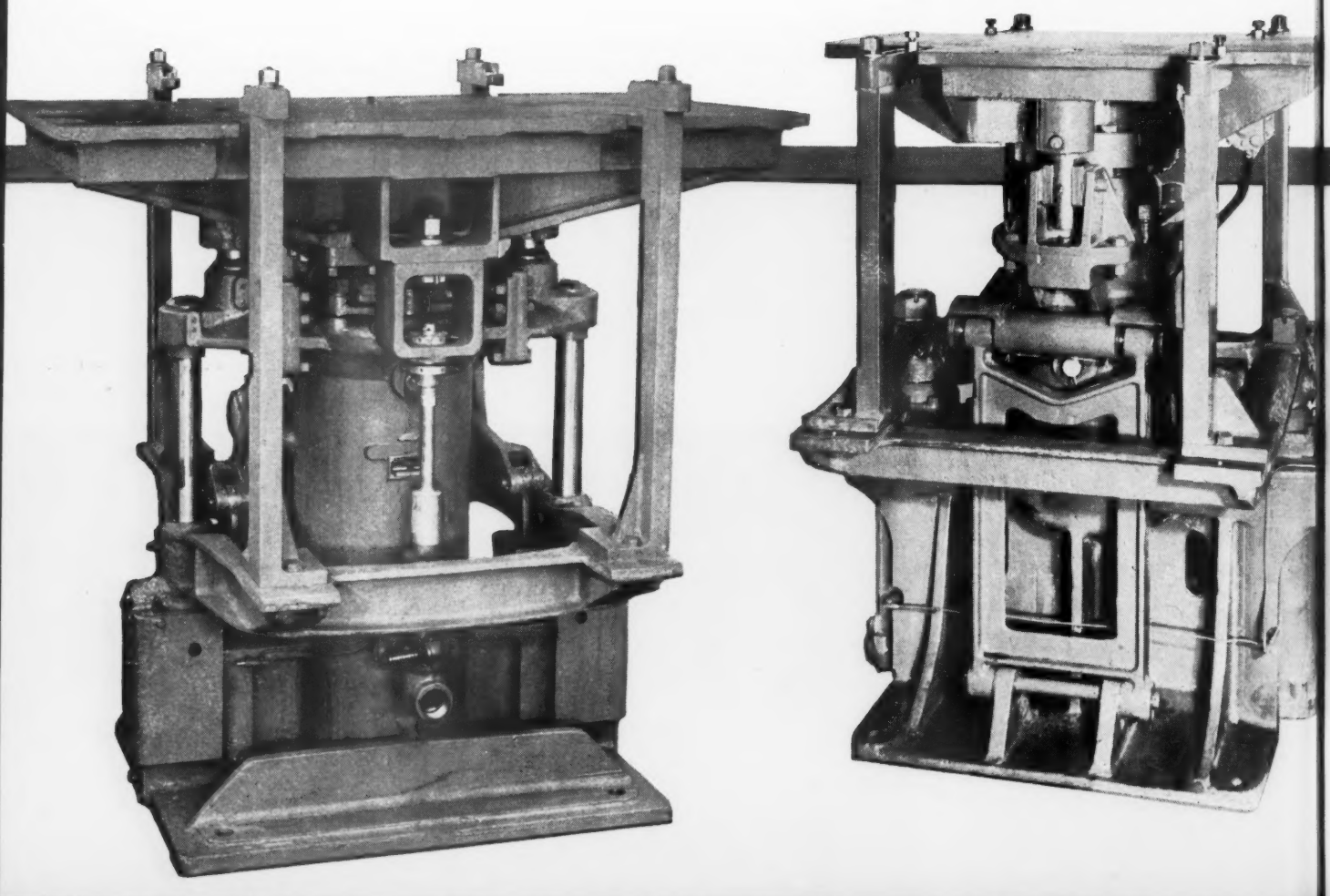
LIFT PIN ADJUSTMENT...



THE OSBORN MANUFACTURING COMPAN
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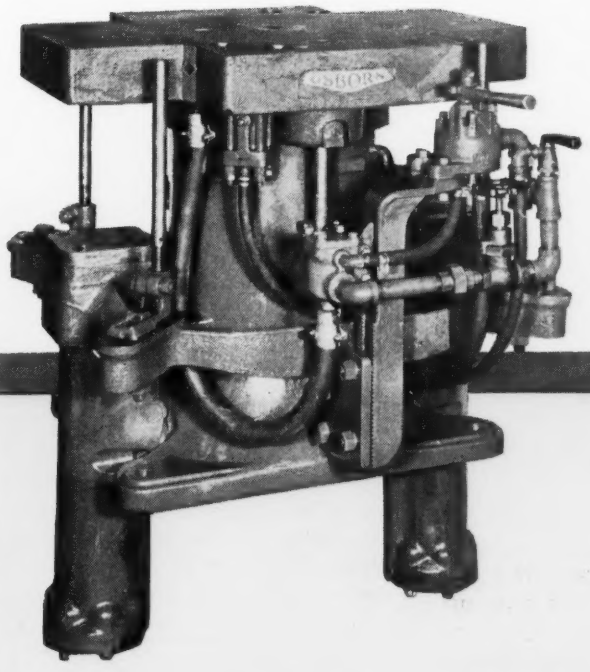
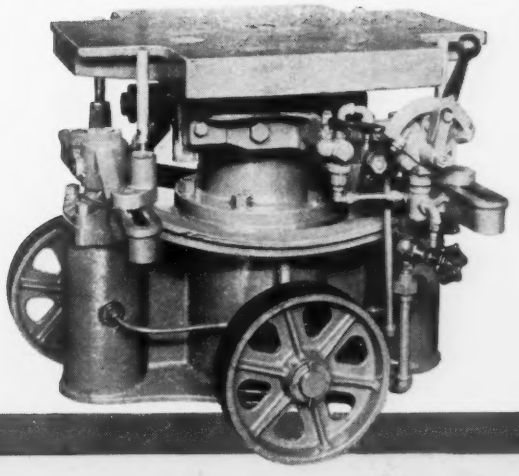
R FEATURE *Above-the-floor*





You pay no penalty for size when you select a unit from Osborn's complete line of jolt strippers. Whether it is a small portable unit or a large machine requiring pit type foundation, the convenient flexibility of the above-the-floor lift pin adjustment assures quick handling of a wide range of flask sizes.

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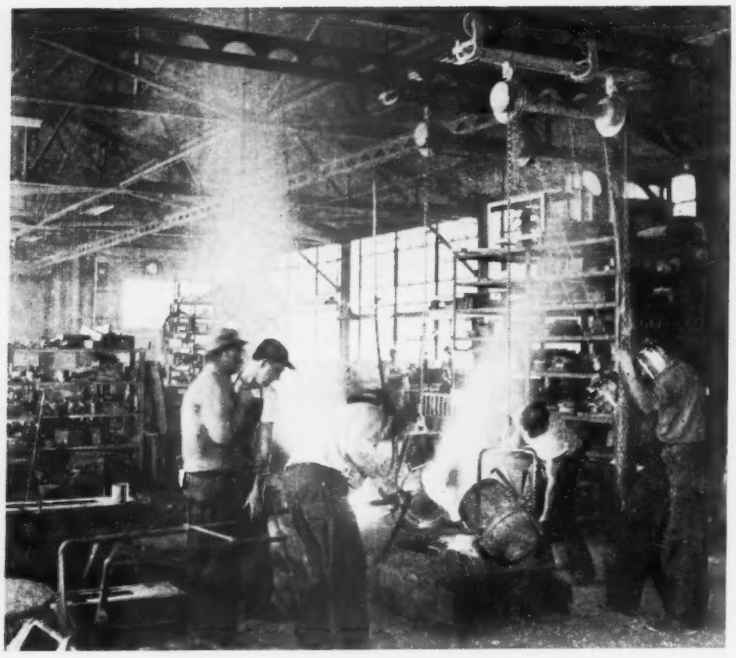
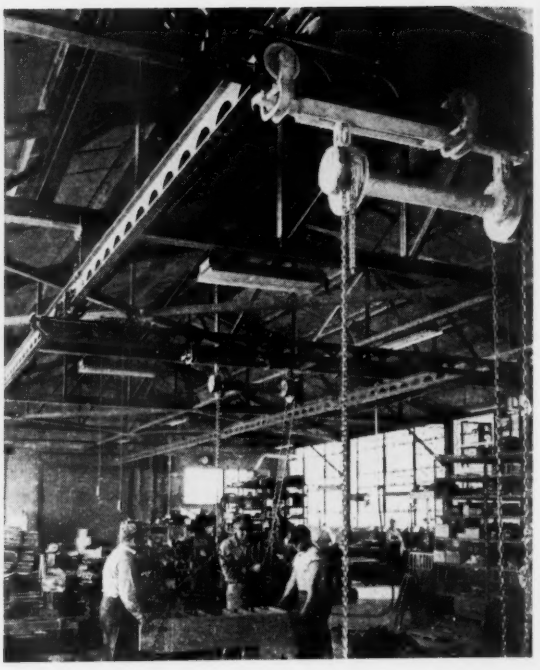
MOLDING MACHINES · CORE BLOWING MACHINES · INDUSTRIAL BRUSHES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA



Extended hand-chain wheel avoids need for any man to stand close to metal while it is being poured



Cranes make mold handling easy. Transfer crane in foreground interlocks with furnace room spur

New Nonferrous Foundry Lets

CRANES LIGHTEN THE LOAD

THE new foundry of Seagrave Corp., Columbus, O., builders of fire-fighting equipment, employs only ten men, but it is thoroughly modern. Erected in 1950, it was laid out and equipped to eliminate the bad features of the firm's old foundry.

Seagrave has used Cleveland Tramrail equipment for handling applications in its large plant since 1927. Because this experience made it easy for the company to visualize accurately the benefits that an overhead system could offer a foundry, it installed a two-track runway with two transfer cranes that serve the molding floor. These interlock with a spur that leads to a small track and switch arrangement in the adjoining furnace room. Hand-propelled, the system is of 1000-lb capacity.

Up to 3000 lb of brass and bronze castings for pumps, valves, impellers, suction pipes and similar applications are poured in an 8-hour day. They weigh from 1 oz to 450 lb, and many are of intricate designs which require unusual coring. Cranes are used for every operation where the weight involved is too great for manual handling.

In the old foundry, it was a hard job for two or even three men to pour with No. 80 crucibles. Crucible, shank and metal weigh about 300 lb, all of which had to be carried and guided while 20 to 40 molds were poured. This created an accident hazard in the form of spilled metal, and was a contributory factor in the high rate of absenteeism.

Tramrail cranes in the new foundry have lightened work by 50 per cent, according to the foundry foreman. Danger from hot metal spillage is minimized, workers are relieved of considerable fatigue, and absences are negligible. In addition, the crane system is credited with having had much to do with greatly stepped up output per man.

Metal from No. 80 stationary and No. 250 tilting furnaces is carried directly to molds in No. 80 crucibles

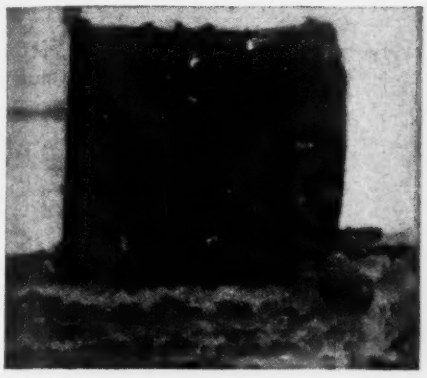
Lebanon Steel Foundry Is Cited for Defense Work

Lebanon Steel Foundry, Lebanon, Pa., has been cited by the Philadelphia Ordnance District for its production of castings for tanks and for developments which have resulted in "substantial savings to our government."

Of 60,000 castings delivered to the Detroit Arsenal by Lebanon Steel Foundry for use in tanks, only 15 were rejected. In addition, the company designed and manufactured patterns for use in castings for tank ventilation louvers. In his letter of citation to Lebanon president William H. Worrilow, Col. W. K. Ghormley, deputy chief of the Philadelphia Ordnance District, stated that "the use of cast louver doors has proved to be more economical than fabricated doors."

OUTSTANDING CUPOLA CAST IRON DEOXIDIZER!

New FERROCARBO patented Briquette disperses completely in 57.5 seconds



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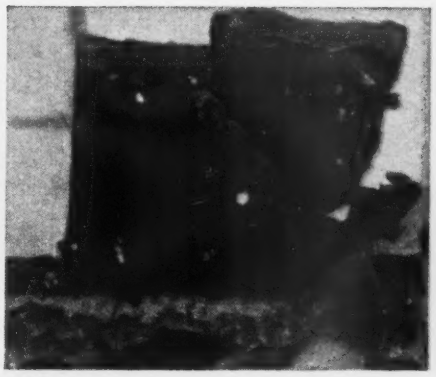

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57.5 SEC.

Here's dramatic proof, in actual film sequences, that FERROCARBO Briquettes are truly *effective* in deoxidizing cupola iron. Rapid, controlled disintegration of FERROCARBO Briquettes is *complete* in the melting zone. 100% dispersion of the briquette throughout the metal means a thorough reaction in the cupola. You can't match FERROCARBO Briquettes for uniform cupola operation ... for castings that are cleaner, more uniform, easier to machine. No wonder nearly 600 leading foundries are deoxidizing their cast and malleable iron with FERROCARBO Briquettes!

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JOBBING and PRODUCTION OPERATIONS

Facilitated by Lift Trucks

Fig. 1—When very large molds are prepared, fork trucks deliver tote boxes of facing sand for manual spreading. A slinger completes the ramming

MODERN materials handling combined with scientifically engineered foundry practices has enabled Electro-Alloys Division of American Brake Shoe Co., Elyria, O., to operate successfully as a job shop and production foundry. High-quality specialty castings and regular production items are produced simultaneously using the same facilities without interfering with one another.

Over 100,000 sq ft has been provided for the production of high content nickel and chrome alloy castings. The foundry is made up of two main bays 60 ft wide and over 450 ft long. Finishing, inspection and shipping are located in another building on the other side of a narrow bay containing the railroad siding. Just beyond is an outdoor storage area, accessible to plant trucks and highway trucks. The heart of the foundry is the furnace area where three top-charge and three induction furnaces can provide heats ranging from 200 to 12,000 lb.

Actual material handling can be divided into three main phases: Receiving and storing raw materials; handling in production; and finished products storage and shipping. Raw materials arrive by rail and truck. Railway cars delivering sand are spotted either at the molding sand mill or the coremaking sand mill, and are emptied directly into floor hoppers where a bucket elevator system delivers the sand to storage bins over each mill.

Alloy scrap is delivered by highway truck and stored outdoors. Bulk shipments of ferroalloys are unloaded by a powered scoop truck and stored in bins along the railroad track. Alloys arriving in drums or boxes are unloaded by fork truck and stored in the melting department. Scrap from the finishing department and from outdoors also is brought to the melting department by fork trucks.

Naturally, handling problems are greatest in the shop where materials are moving through production. Fork trucks help move patterns and coreboxes into the foundry and coremaking department. In the foundry, molding sand is first mulled and delivered to the benches by an overhead distribution belt. Manually controlled

(*Concluded on page* 180)

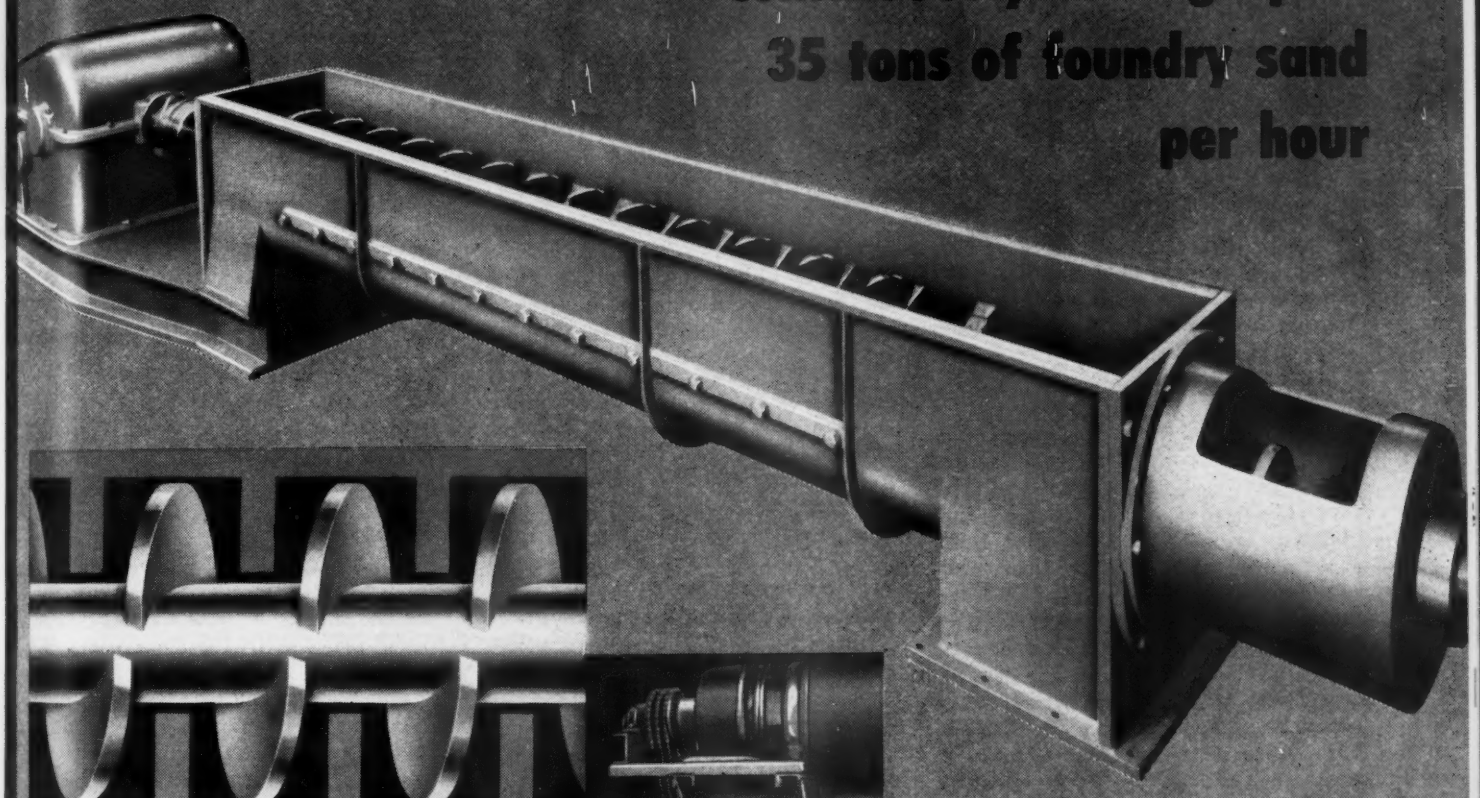
Fig. 2—Charging materials are dumped into "orange peel" charging bucket in pit. After furnace is charged, bucket is put on stand in rear, and "orange peel" sections bound in place

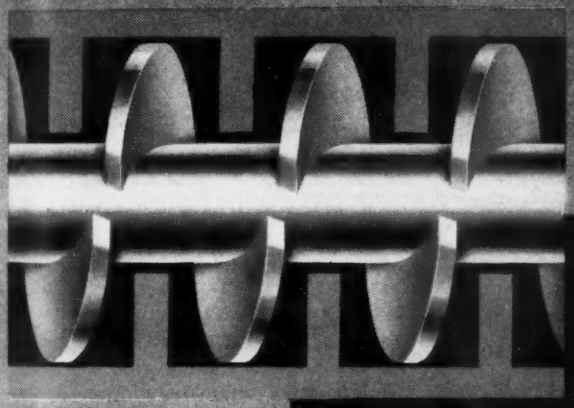
Fig. 3—An electrically powered, 4000-lb fork truck delivers a load of castings from cleaning department to workers at hood-ventilated flat grinding benches

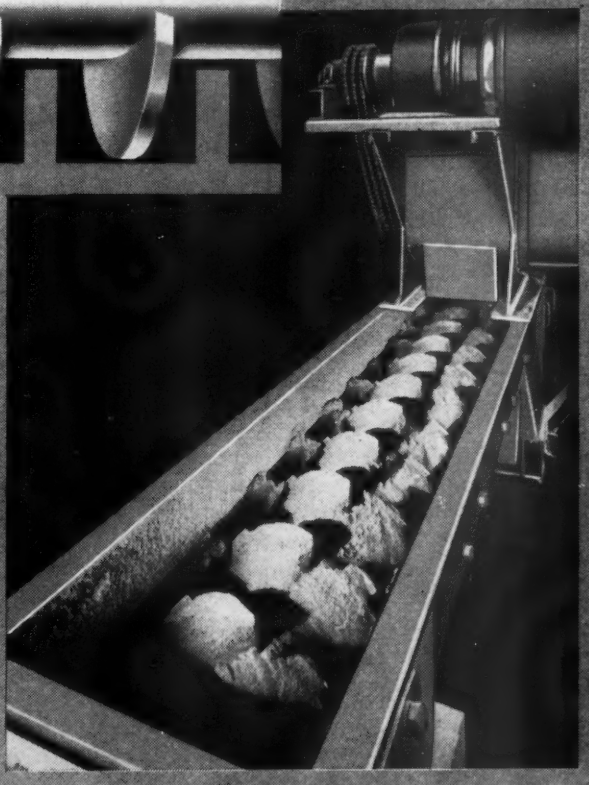
Baker Perkins Ko-Kneader

(LIST SYSTEM)

an efficient new unit for continuously mixing up to 35 tons of foundry sand per hour







B-P Ko-Kneader in operation handling foundry sand

With revolutionary Baker Perkins Type M List System Ko-Kneaders, continuous mixing of foundry sand becomes a highly practical operation. Essentially, the Ko-Kneader is a mixing worm revolving as well as reciprocating in a trough provided with kneading teeth in such a way that the mixing worm works as a single mixing machine with each tooth. The repetition of this operation, as the sand moves along the trough, completes the mixing and mulling. Baker Perkins Ko-Kneaders save considerable mulling time and also help to improve casting quality because the intense mixing action blends the sand uniformly and thoroughly. Baker Perkins Ko-Kneaders are ruggedly built for long life and dependable service. When used with specially designed Baker Perkins Feeders, operation of the Ko-Kneader is almost entirely automatic, resulting in substantial savings in labor costs. Consult a Baker Perkins sales engineer or write today for complete information.

BAKER PERKINS INC. foundry equipment sales • saginaw, michigan

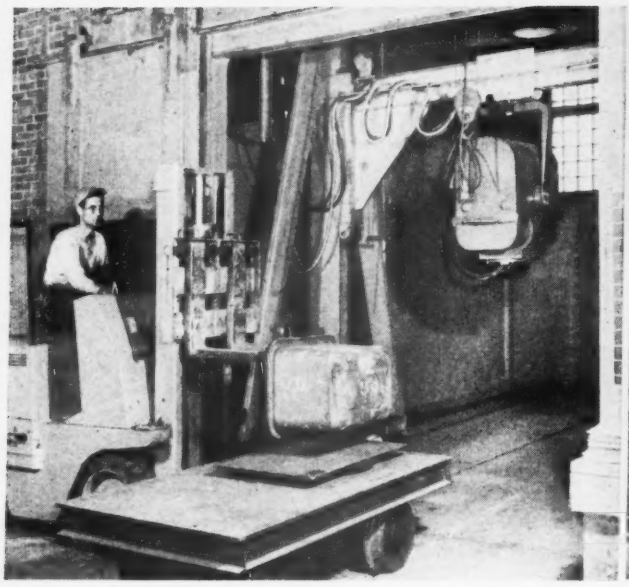


Fig. 4—A cyanide heat treating pot is brought to an exposure room for radiographic examination. Overhead cranes are used to deliver large castings to flat car

Fig. 5—Fork truck delivers finished material to shipping department. Overhead crane moves large castings. Hand trucks are used to move light loads to the scales and to load them

(*Concluded from page* 178)

plowoffs direct the sand from the belt into hoppers over each bench. Each bench is fed by three chutes for handling molding, facing and backing sand.

The well-rigged slinger floor with its mobile sandslinger easily can ram mold sections up to 9 x 15 ft, weighing 12,000 lb. Fork trucks deliver tote boxes of facing sand (Fig. 1) for these large molds. This sand is shoveled manually into the bottom of the mold to make sure that all corners are filled, after which the slinger takes over. Average size of molds rammed is close to 500 lb and includes such items as heat resistant retorts, large annealing and carburizing pots, continuous type muffles, grates, flange pipe sections and other heat and corrosion resisting castings. When empty the slinger backs up beneath the overhead hopper to receive sand and is ready to go again in a matter of minutes.

Most small and medium size castings are poured on the jolt floor. Plain air jolt, jolt-rollover, and jolt-squeeze-strip molding machines handle molds ranging from 14 x 18 in. to 5 x 6 ft. Since its introduction into the plant a few years ago, centrifugal molding has been accounting for a steadily increasing percentage of total production, and its share is now considerable.

In the pouring operations, raw materials consisting of scrap metal and virgin metal are weighed on a built-in floor scale and dumped into "orange peel" buckets located in charging bucket pits. Fig. 2 shows a fork truck handling this operation. An overhead crane then takes the bucket to the top-charge furnaces. As the bucket is lowered into the furnaces, a rope holding the "orange peels" together is burned away and the charge empties into the furnace. The bucket then is returned to a stand (shown in the background of Fig. 2) and the "orange peels" are bound together again for the next charge.

Heats are tapped into large teapot bull ladles and carried to the casting area by the 15 ton bridge crane. The larger dry sand molds are poured directly from the bull ladle, while smaller hand-operated shank ladles, filled from the bull ladle, handle the pouring of small molds.

Poured molds then move to shakeouts at the end of the floor. Castings are carried first to the cleaning room, then to grinding benches by fork trucks (Fig. 3), while a conveyor belt carries the sand over a magnetic separator back to the muller for reconditioning. Empty flasks are moved back to the molding machines on roller conveyors. Because of the prompt movement of material through various stages expensive production equipment seldom is tied up.

Finished castings move through inspection and heat treating to the shipping dock at the north end of the plant. The inspection department is equipped with two x-ray machines for radiographic examination of such castings as valves, muffles, heat treating pots and other holding vessels. Fig. 4 shows one of the exposure rooms and a fork truck placing a cyanide pot on a flat car which runs on tracks into the room. Larger pieces are brought to the flat car by overhead cranes. Approximately 300 x-ray negatives are exposed, developed and examined each day.

In the shipping department itself, either overhead cranes, fork trucks, or hand lift trucks are employed in loading finished material into highway trucks or railroad cars. Although the loading dock does have a ramp, fork trucks often deliver loads as shown in Fig. 5. Hand trucks then move the load to the floor scale for weighing.

Every effort has been made to provide material handling equipment best suited for the particular operation. An important factor in assuring economy of handling is the careful layout of facilities which direct movement of all materials through production to final shipping.

Photographs by Baker Industrial Truck Division, Baker-Raulang Co., Cleveland.

Book Review

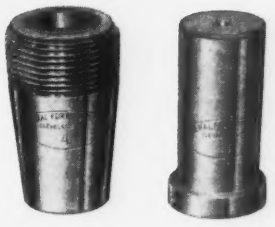
Fifty Year Index, cloth, 207 pages, 6 x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $6.

This volume provides a detailed author and subject index to all American Society for Testing Materials technical papers and reports relating to materials, their properties and testing, which have appeared in its publications from 1898 to 1950. It is intended to make readily available to the materials technologist, researcher, and librarian pertinent information on a particular subject or author with minimum expenditure of time and effort.

The author index precedes the subject listing, and gives the complete titles of papers and items covered. A separate condensed subject index lists technical symposiums

FEDERAL Rubber Grips

FEDERAL handles reduce sharp-edge shovel grip damage to flasks, patterns. Correct shape and taper—small enough to be used in corners. Malleable iron, rubber-covered. Fit any make shovel.

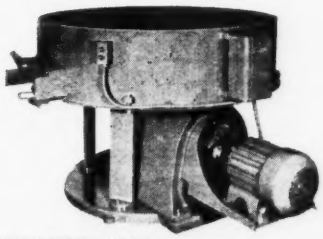


FEDERAL Blast Nozzles

Cut cleaning costs by saving on air, reducing down-time, reducing "hour-service" cost of nozzles, increasing blast efficiency. Made of highly refined tungsten-carbide for unusually long service.

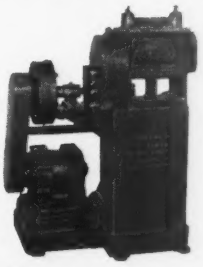
MIJET Core Blower

For fast, economical production of oil sand cores weighing up to 3 lbs. each. Easy to operate—easy to adjust—no tools required. Core boxes to 6½" high. Large blowing surface, 9½"x12".



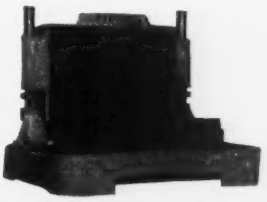
WHIRLMIX Sand Mixer

Four popular models now available, for mixing 15, 100, 300 or 600 lbs. of sand. Flexible whirling blades insure thorough mixing without crushing or heating sand grains. Low upkeep.



CLIMAX Wire Straightener

Your foundry can save on core wire by straightening and re-using wires and rods. The Climax is easy and safe to operate. Straightens random lengths. Six models, 1/16" to ¾" wire.



VIBRA-DRAW Core Drawer

Draws cores easily and quickly in driers or flat plates. Every draw an accurate, straight lift. Easily operated by inexperienced help. Floor or portable bench models.

LIGHTNING Flask-Clamps

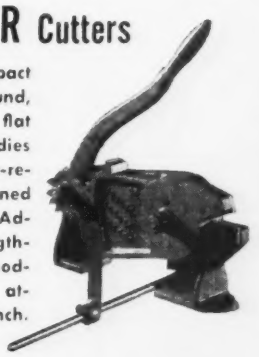
Here's a sturdy, reinforced flask-clamp, made of malleable iron. Easily applied — quickly removed. No wedges, no loose parts, no projections. Two popular sizes.

SHUR-SPOT Sprues

Make perfect pouring sprues as mold is squeezed—pop out when squeezer board is removed. Can easily be applied to your gated or plated patterns. Wide range of sizes.

WONDER Cutters

Handy, compact cutter for round, square or flat steel. Cutter dies made of wear-resistant, hardened alloy steel. Adjustable length-gage. Two models. Easily attached to bench.



WRITE FOR LITERATURE!

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The **FEDERAL FOUNDRY SUPPLY** *Company*

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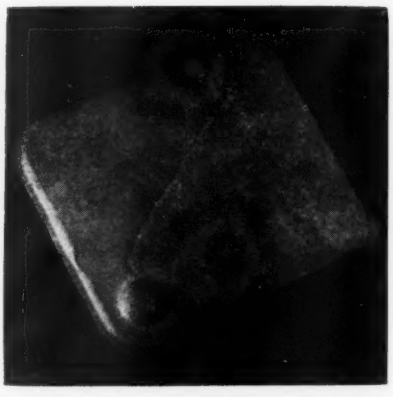
VOLCLAY BENTONITE

NEWS LETTER No. 31

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

Rat-*Tails*...



The "Rat-tail" has been referred to as a minor buckle, or the first phase of an expansion defect. It usually occurs on the cope side, but may also be found on the drag side particularly on larger flat surfaces. These rough, irregular projections which appear under the surface of the casting may or may not contain loose, adhering, molding sand. This molding sand does not become encased until the expansion defect develops to a point where a scab occurs.

The most common occurrence of **a "Rat-tail" is usually found on thin, flat surfaces** as illustrated by the figure.

The most common cause of a "Rat-tail" defect is high sand expansion, combined with high hot strength.

The quickest remedy is to add approximately 1% by weight of Five Star Wood Flour, decrease the ramming to not exceed 60 green mold hardness, increase the seacoal content slightly, add enough Panther Creek Southern Bentonite to increase the green compression strength to at least 9 lbs. p.s.i., or increase the deformation slightly by a small addition of corn flour.

Uneven ramming of the mold surface may rapidly develop "Rat-tail" defects. Hard ramming close to the pattern aggravates this defect and tends to increase the depth of the defect.

Photo Courtesy of: Bradley H. Booth

If the defect occurs when the molding sand is rammed by a slinger, **a facing mixture is recommended to cushion the sand** between the pattern surface and the molding sand proper. This controls the green hardness.

Poorly mulled sand, poorly mixed sand, or poorly aerated sand may develop this defect sharply. A hot sand mixture is a direct cause of such a defect which encourages high sand expansion.

Many foundrymen state that this defect **occurs more rapidly and more often when the base molding sand has a poor distribution,** as better distribution is obtained through a wider spread.

When fines tend to build-up rapidly in the sand system, the surface **density of the mold becomes much greater, and sand expansion defects increase.**

Pouring very slowly against a large cope flat surface encourages such defects. **Fast pouring should be employed.**

When Panther Creek Southern Bentonite is used as the bond, "Rat-tail" defects are less apt to occur. There is less volume change in the molding sand mixture.

Insure against "Rat-tails" by using both Panther Creek Southern Bentonite and Five Star Wood Flour. Control ramming to avoid excessive green mold hardness.

AMERICAN COLLOID COMPANY

CHICAGO 54, ILLINOIS

Producers of Volclay and Panther Creek Bentonite

STANDARD SPECIFICATIONS FOR BRONZE CASTINGS IN THE ROUGH FOR LOCOMOTIVE WEARING PARTS

ASTM Designation: B 66—52

Adopted, 1938; Revised, 1944, 1946, 1949, 1952.

Scope

1. (*a*) These specifications cover four compositions of bronze castings in the rough for locomotive wearing parts. The particular composition desired shall be specified in the order or agreed upon by the manufacturer and purchaser.

(*b*) The purposes for which these compositions are ordinarily used are as follows:

Phosphor Bronze.—Shoes and wedges, floating rod bushings, or where a hard wearing surface is required.

Hard Bronze.—General purpose wearing metal, may be cast in either sand or metal molds, for rod bushings, shoes and wedges, cross-head gibs, engine truck and trailer brasses.

Medium Bronze.—May be cast in sand or metal molds for driving box engine and trailer truck brasses, hub liners, and bearings requiring lining metal for facing or lining.

Soft Bronze.—Generally cast in metal molds for driving boxes and special purposes where a soft metal is desired.

Chemical Composition

2. (*a*) The material shall conform to the requirements as to chemical composition as prescribed in Table I.

Table I—Chemical Requirements

	Phosphor Bronze		Hard Bronze		Medium Bronze		Soft Bronze	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Copper, per cent	remainder		remainder		remainder		remainder	
Tin, per cent	**7.0**	**9.0**	**6.0**	**9.0**	**6.0**	**8.0**	**4.0**	**6.0**
Lead, per cent	**9.0**	**12.0**	**10.0**	**16.0**	**16.0**	**22.0**	**23.0**	**27.0**
Zinc, per cent		0.75		1.25		1.25		1.25
Nickel, per cent		**1.00**		0.50				
Iron, per cent		0.15		0.20				
Antimony, per cent		0.75		**0.75**				
Phosphorus, per cent	**0.20**	**0.50**		0.05				
Other impurities, max., per cent		0.50		0.35		0.75		0.75

NOTE.—Analysis shall regularly be made only for the elements designated in **boldface type.** However, the presence of the other named elements outside of the limits specified in this table shall constitute cause for rejection of the castings.

(*b*) Where no requirements are prescribed for maximum impurity, these elements may be present up to any amount to come within the total impurity specified, provided the material otherwise meets the chemical and physical tests. Where maximum percentages are specified, the elements referred to are considered as impurities and shall not be intentionally added.

Chemical Analysis

3. An analysis shall be made by the purchaser or his representative from one casting representing each lot of 100 castings or fraction thereof. The chemical composition thus determined shall conform to the requirements specified in Section 2 (*a*) for the particular alloy.

Sample for Chemical Analysis

4. (*a*) The sample for chemical analysis shall be taken from the casting broken in the fracture test (Section 6) at three points along the fractured surface. Drillings through the skin shall be rejected. Equal quantity of drillings from each hole thoroughly mixed shall constitute the sample for chemical analysis.

(*b*) All samples shall be kept free of oil and shall be carefully treated with a magnet to remove any iron introduced in taking the sample.

Method of Analysis

5. Chemical analysis shall be made in accordance with the Standard Methods of Chemical Analysis of Special Brasses and Bronzes (ASTM Designation E 54).

Examination of Fracture

6. The casting representing a lot for acceptance shall be broken through the center and parallel with the longitudinal axis of the bearing in order to ascertain the uniformity of the grain of the metal. When this fracture shows separation or imperfect mixing of the component parts, or dross or dirt spots, the lot shall be rejected.

(*Concluded on page* 184)

STANDARD SPECIFICATIONS FOR BRONZE CASTINGS IN THE ROUGH FOR LOCOMOTIVE WEARING PARTS

ASTM Designation: B 66—52

Adopted, 1938; Revised, 1944, 1946, 1949, 1952.

(*Concluded from page* 183)

Number of Tests

7. One casting representing each lot of 100 castings, or fraction thereof, shall be taken for the fracture test.

Significance of Numerical Limits

8. For purposes of determining compliance with the specified limits for requirements of the properties listed in the following table, an observed, or a calculated value, shall be rounded off as indicated in accordance with the rounding-off method of the Tentative Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation E 29).

Property	Rounded-off Unit for Calculated or Observed Value
Chemical Composition	Nearest unit in the last right-hand place of figures

Permissible Variation in Dimensions

9. The purchaser will furnish drawings showing the dimensions of the castings ordered and permissible variations therefrom, and all castings shall conform to the gages and dimensions shown on the drawings.

Workmanship and Finish

10. The castings shall be sound, free from blowholes, flaws and shrinkage cracks, and shall show good foundry practice and workmanship.

Marking

11. All castings shall have cast on them the manufacturer's initial or trade mark, the pattern number, and such other marks as are shown on the drawings. When serial numbers are specified, each lot of 100 castings, or fraction thereof, shall bear the same serial number, commencing with the numeral one at the beginning of the year and continuing consecutively until the end of the year, at each manufacturer's plant.

Inspection

12. (*a*) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector, without charge all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection at the place of manufacture shall be made prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

(*b*) The purchaser may make tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests shall be made at the expense of the purchaser.

Rejection

13. Castings that show injurious defects revealed by machining operations subsequent to acceptance may be rejected, and if rejected, the foundry shall be notified within 30 days. The full weight of the original material rejected shall be returned to the foundry. The foundry shall not be responsible for the costs of machining defective castings.

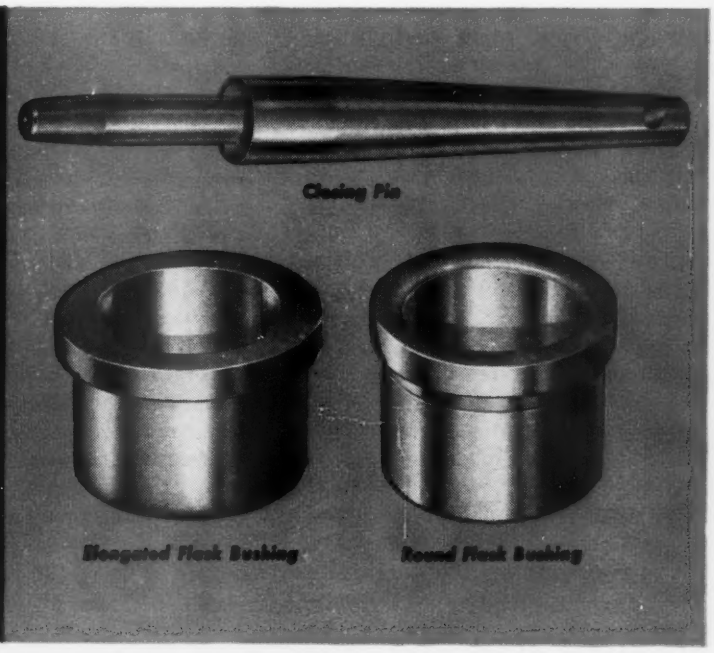
Rehearing

14. Samples tested in accordance with these specifications that represent rejected material shall be preserved 14 days from the date of the test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

Additional copies of this specification may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., for a nominal sum.

UNIVERSAL flask pins and bushings can convert wasted time into money in your foundry

Universal Flask Pins and Bushings save precious minutes by assuring instant, accurate alignment of cope and drag. Since they are heat-treated and precision ground from high quality steel to stand up under rough treatment, Universal Flask Pins and Bushings also save the cost and down-time that replacement always requires. Cope Bushings are quickly guided to Drag Pins over tapered, loose-fitting Closing Pins which are easily removed after assembly. The special elongated Flask Bushing is designed to permit longitudinal expansion to compensate for metal heat *without affecting accurate alignment.* Standard sizes are carried in stock — special sizes and types to order. Direct your inquiries and orders to the office nearest you — 1060 Broad St., Newark, N. J., and 5035 Sixth Ave., Kenosha, Wisconsin — or write to our home office.



67

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

ELECTRIC FURNACE STEEL CONFERENCE

Considers Trends in Melting Methods

By EDWIN BREMER
Metallurgical Editor
FOUNDRY

INCREASING interest in problems associated with steel made electrically was clearly indicated by the large attendance at the tenth annual Electric Furnace Steel Conference held at Hotel William Penn, Pittsburgh, Dec. 4-6. Registered attendance was 826—about 10 per cent larger than the year before and over 33 per cent greater than in 1950. Meeting in 1953 will be held at the Netherland-Plaza Hotel, Cincinnati, Dec. 3-5.

New chairman of the Electric Furnace Steel Committee is W. M. Farnsworth, Republic Steel Corp., Massillon, O., and past chairman is Ray H. Frank, Bonney-Floyd Co., Columbus, O. Floyd O. Lemmon, Ohio Steel Foundry Co., Springfield, O., becomes chairman of the committee for the 11th conference, while H. F. Walther, Timken Roller Bearing Co., Canton, O., will be vice chairman.

Discuss Melting Methods

On Friday two sessions of the conference were devoted to discussions relating to electric furnace steel castings. Morning session dealt with trends in melting methods while that in the afternoon related to rare earth additions, rapid analysis and a review of practices. Saturday morning's session comprised a panel discussion on procedure in making a stainless steel heat.

In the first session Charles W. Vokac, Whiting Corp., Harvey, Ill., spoke on "Relation of Power Input and Controls to Efficiency and Quality of Steel Production." Victor E. Zang, Unitcast Corp., Toledo, O., and Robert H. Jacoby, Key Co., East St. Louis, Ill., were chairmen. Mr. Vokac described power supply and methods of control of power factor, load factor and surge factor. He also pointed out how maximum demand rate could be held to a minimum, and load factor improved by use of several furnaces. Other phases discussed by Mr. Vocak included transformers, furnace regulators and electrode control, and automatic electrode clamp.

W. R. Punko, Wehr Steel Co., Milwaukee, stated that in his plant two 2500-kw transformers were replaced with two 6500-kw units instead of purchasing an additional furnace and transformer equipment. The increased power supply resulted in a reduction in heat time of ½ hr, or from 1.7 to 1.2 hr, as well as in decreased power consumption per ton melted of 15 kwh, or from 485 kwh per ton to 470. Disadvantage was reduction in lining life from 400 to 300 heats, and in roof life from 250 to 200 heats.

P. J. Neff, American Steel Foundries, East Chicago, Ind., in discussing effect of acid and basic melting on fluidity and hot tears said that when the proper slag volume is maintained on the ladle in basic heats, and melting and pouring conditions are under control, there is little difference in fluidity between acid and basic heats. Basic electric steel, due to its lower sulphur content, is less subject to hot tearing than acid electric steel.

John W. Juppenlatz, Lebanon Steel Foundry, Lebanon, Pa., presented a paper prepared in co-operation with Thomas S. Quinn Jr. on "Comparison of Acid and Basic Electric Steel for Castings" in which the authors concluded that choice of either practice for small and medium steel and alloy castings appears to be a matter of economics and objectives. While overall melting costs of plain carbon basic steel are higher than for acid steel—owing to refractories —other economic factors of total foundry costs and objectives cannot be neglected. Hot tears or loss of other qualities can overbalance mild increase in melting cost. Saving of Mn or Cr in the basic process is significant and with high alloy steels is important.

Friday afternoon session was under the guidance of Herbert H. Blosjo, Minneapolis Electric Steel Casting Co., Minneapolis, and W. L. Doyle, Pittsburgh Steel Foundry Corp., McKeesport, Pa., with C. G. Mickelson, American Steel Foundries, East Chicago, Ind., B. R. Boyd, Applied Research Laboratories, Detroit, and C. E. Sims, Battelle Memorial Institute, Columbus, O., as speakers. Mr. Mickelson presented a paper prepared in co-operation with G. A. Lillieqvist, also of American Steel Foundries, on additions of rare earth elements to steel. Those materials, in the form of an alloy of cerium, lanthanum, etc., were added to basic steel in the amount of 2 lb per ton by wiring them to a bar of steel 1½ in. in diam and 12 in. long, and throwing the bundle into the ladle at the juncture of the metal stream and the metal in the ladle. Addition was made after the aluminum.

Results obtained indicate that rare earth additions have a beneficial effect on the following properties: Ductility, impact, inclusions, hot tears, fluidity, sulphur reduction, solidification, porosity, weldability, and feedability. No effect was observed on tensile and yield strength properties, temper brittleness, and hardenability.

Limit Rare Earth Additions

James A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala., in the discussion pointed out that rare earth additons to 12 per cent Cr steel, 24 per cent Cr-12 per cent Ni steel and boron steel showed little improvement in properties. F. W. Boulger, Battelle Memorial Institute, Columbus, O., stated that proper addition of rare earth must be made since either small or large amounts are detrimental to the toughness of steel. Robert H. Jacoby, Key Co., East St. Louis, Ill., said that no improvement was observed when additions were made to acid steel. Norman Tisdale, Molybdenum Corp. of America, Pittsburgh, commented that indications were that with proper practice, additions of rare earths to acid steel permitted approach to results obtained with basic steel.

B. R. Boyd, Applied Research Laboratories, Detroit, presented a paper which he co-authored with M. F. Hasler of the same firm on "Use of the Quantometer for Rapid Steel Analysis." This included a brief description of the latest developments in the recording type spectrometer using up to 35 multiplier phototubes to permit analyzing a large number of elements in steel as well as in slag. Analysis of steel takes from two to four minutes while a complete slag analysis can be made in 20 minutes. Information also was

(*Concluded on page* 188)

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GRINDING WHEEL INSTITUTE MEMBER

BAY STATE ®

(*Concluded from page* 186)

presented on accuracy and cost of installation.

Concluding paper by Clarence E. Sims, Battelle Memorial Institute, Columbus, O., was entitled "A Review of Metallurgical Practices and Their Effects," and most of the viewpoints presented by the author were published in his article "Things We Know and Don't Know About Cast Steel" which appeared in the September, 1951 issue of FOUNDRY. Phases covered by Mr. Sims included the boil, gases, slags and their control, deoxidation and use of mischmetal.

Conference was closed with a panel session Saturday morning on "Procedure in Making a Heat of Stainless Steel." Moderator was Gerhard Derge, Carnegie Institute of Technology, Pittsburgh. Panel was composed of J. H. Bischoff, Bethlehem Steel Co., Bethlehem, Pa.; J. G. Mravec, Timken Roller Bearing Co., Canton, O.; D. L. Clark, Simonds Saw & Steel Co., Lockport, N. Y.; R. J. Wilcox, Michigan Steel Casting Co., Detroit; Floyd O. Lemmon, Ohio Steel Foundry Co., Springfield, O.; H. Green, U. S. Steel Co., Duquesne, Pa., and W. T. Bryan, Duriron Co., Dayton, O.

In this discussion it was pointed out that in castings production the usual 18-8 charge is composed of 70 to 80 per cent scrap which includes about 60 per cent returns such as gates, risers, etc., and the remainder remelt pig. Balance of the charge is steel, low-carbon ferrochromium, nickel and deoxidizers. With such high scrap the only practical method of reducing carbon to the desired range is by use of oxygen. Temperature range should be 3100 to 3150°F to prevent waste of oxygen. In a 4000-lb heat the carbon flame appears about one minute after oxygen is injected. After that subsides, the oxygen injection is continued for about another minute —total time being 4 to 5 minutes. Close control on oxygen injection must be maintained to hold chromium loss to the minimum.

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MAKE YOUR FOUNDRY CONVEYOR BELT LAST LONGER

Protect Belt From Grease

Permanently Lubricated

Idlers PROVEN in service

SAVE MONEY

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We also manufacture complete Pre-Engineered, Pre-Fabricated, Pre-Lubricated Sectional Belt Conveyor Systems. Write or Wire TRANSALL, Inc., 120 North 11th Street, Birmingham 4, Alabama.

TRANSALL PRE-LUBRICATED IDLERS FOR BELT CONVEYORS

Manual Lists Standard Conveyor Nomenclature

A manual on standard nomenclature for conveyor types and parts has been published by the Conveyor Equipment Manufacturers Association. Called "Conveyor Terms and Definitions," it contains about 1500 listings and line drawings of more than 80 types of conveyors and parts in its 64 pages.

The terminology which for major items is given in French, German, Italian and Spanish, as well as in English, has been adopted by members of the association and is the official standard for the industry. Copies are available from the association, 1 Thomas Circle, Washington 5, or from members of the association.

Book Review

General Metals, by John L. Feirer, cloth, 257 pages, 6½ x 9¼ in., published by McGraw-Hill Book Co. Inc., New York. Price $3.

This book is designed as a comprehensive text in the field of metalworking for a modern industrial-arts program for junior or senior high school students, and while some 22 to 45 pages each are devoted to such phases as wrought iron working, sheet metal, art metal and jewelry, and machine shop, such fields as forging, heat treating, foundry and welding receive only 5 to 11 pages—the latter relating to the foundry.

Mr. Production is high man...

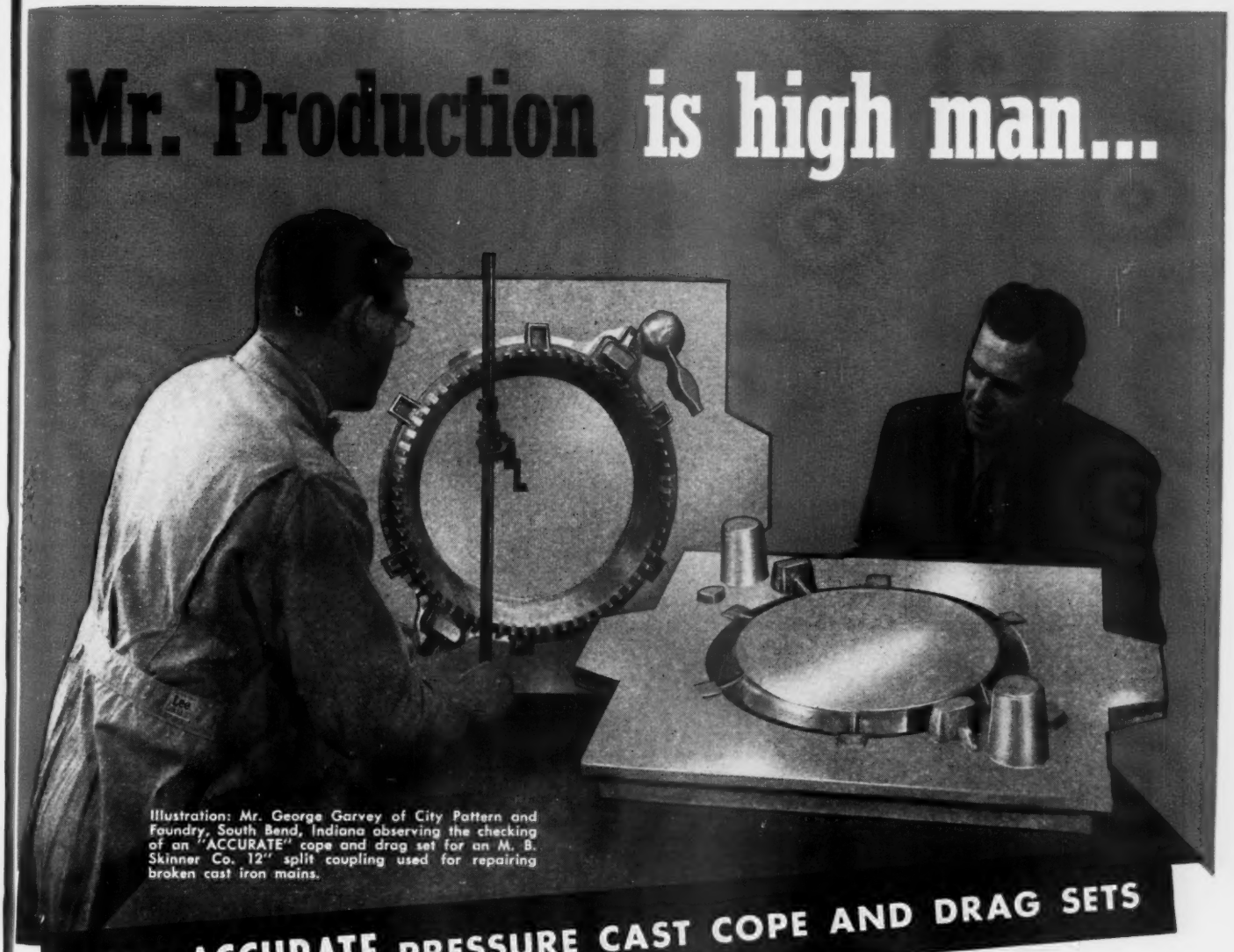

Illustration: Mr. George Garvey of City Pattern and Foundry, South Bend, Indiana observing the checking of an "ACCURATE" cope and drag set for an M. B. Skinner Co. 12" split coupling used for repairing broken cast iron mains.

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Foundries everywhere are looking for means to increase production and lower their costs. ACCURATE cope and drag sets have helped to solve this problem for hundreds of the leading foundries from coast to coast.

ACCURATE cope and drag sets have clean smooth partings and patterns as cast, are straightened, and have alignment points. This will substantially reduce your finishing costs.

Maximum over-all plate dimensions for cope and drag sets are 54" x 64" and 48" x 80".

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Patternmakers at Consolidated Vultee Aircraft Corp. work on the assembly of a wood pattern (left) and check the dimensions of a duraluminum pattern (right)

Labor cost is comparable to that for most aircraft production work

Most tools fabricated at the new shop require 14 to 196 man-hours

Close dimensional tolerances are held consistently by patternmakers

Aircraft Builder Operating NEW PATTERN SHOP

By THOMAS A. DICKINSON

A NEW pattern shop with 25 employees and more than 15,000 sq ft of floor space is being used currently by Consolidated Vultee Aircraft Corp., San Diego, Calif., to fabricate approximately three new production tools per day.

Such tools include wood and aluminum foundry patterns, form blocks, check forms, models and special mockups, all of which are prereleased to the pattern shop by Convair's purchasing department.

"No attempt is made to operate the shop on a mass production basis," General Foreman Charles Shoupe says, "because we feel that each tool should be fabricated with exacting precision by a craftsman who is thoroughly familiar with all details of the design in order to obtain the dimensional co-ordination that is essential to the production of interchangeable parts and assemblies."

"Except for two apprentices, who would be regarded as skilled labor in most shops," Shoupe explains, "each of our patternmakers is a journeyman with at least five years of experience plus enough ability to make any tool we may require. Since we have found that a real craftsman performs most efficiently when he alone is responsible for a project, we never assign more than one man to any given job unless it's impossible for one man to complete the job in a reasonable period of time."

No standard procedures have been established for the fabrication of tools in Convair's pattern shop for fear that they might discourage the use of skill and imagination on the part of the workers. However, patternmakers are expected to observe certain rules which are essential to the consistent construction of usable tools with maximum economy.

In the selection of materials for a pattern, for example, the worker must remember these points:

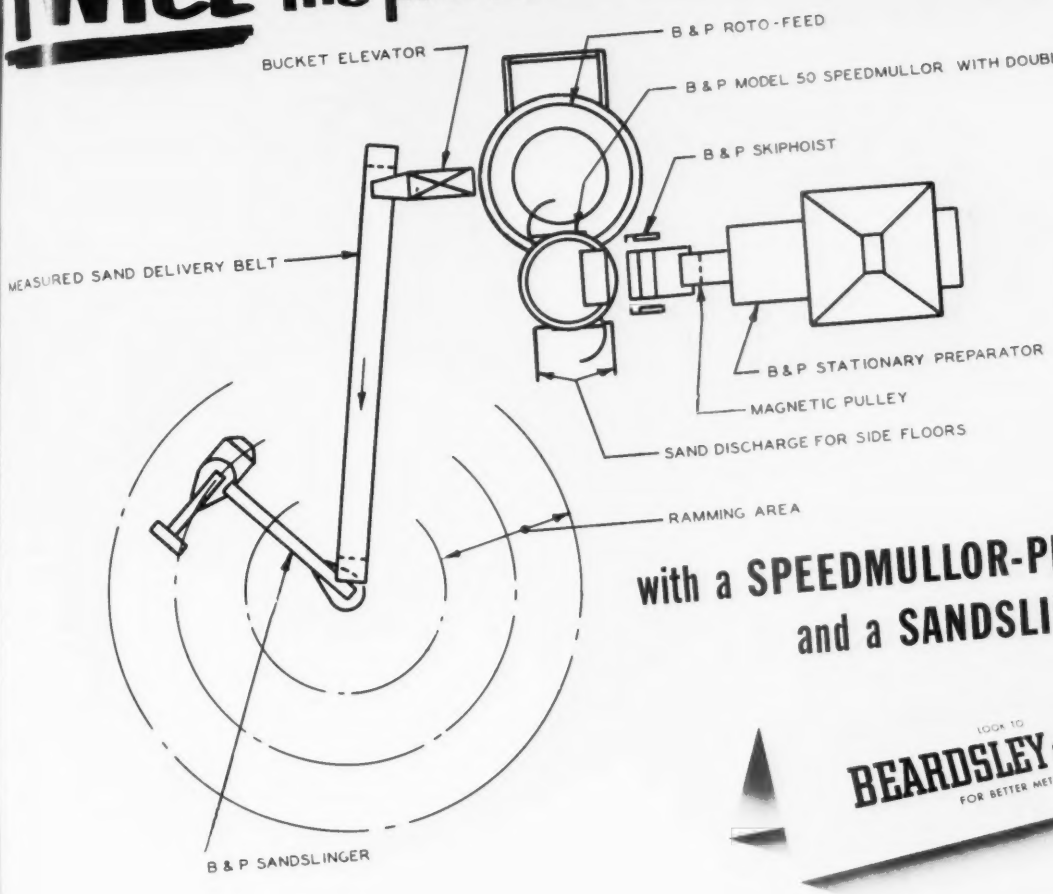
1. Whenever its physical properties will be adequate, pine should be used, in order to minimize material costs and save fabrication time.

2. Mahogany is the preferred wood when close dimensional tolerances are essential.

3. Spruce and plywood cost more than pine, but can be fabricated with comparative ease and should be used where a compromise with the physical properties of mahogany is

(*Concluded on page* 193)

TWICE the production at KEUTHAN FOUNDRY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with a SPEEDMULLOR-PREPARATOR UNIT and a SANDSLINGER

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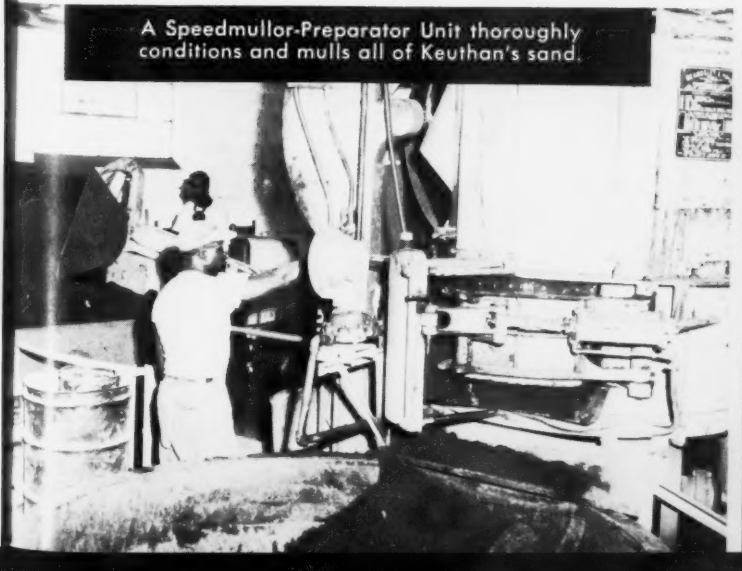
FOR BETTER METHODS

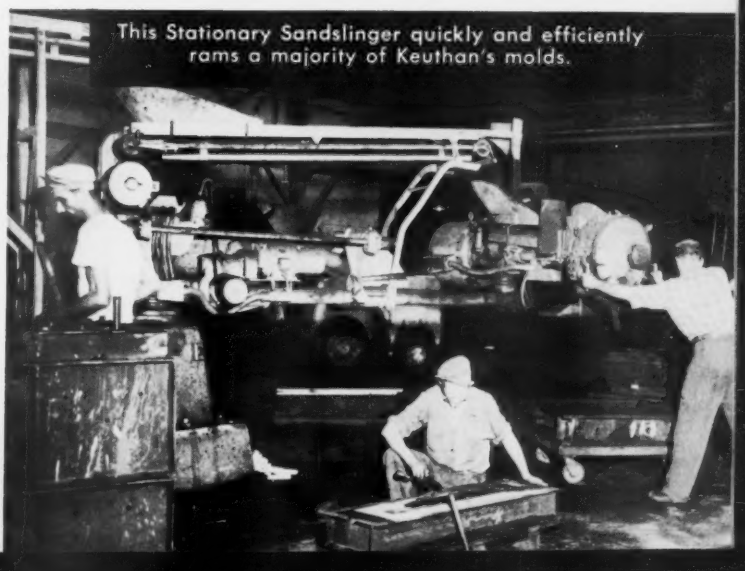
When the Black-Clawson Company, well-known manufacturer of papermaking machinery, took over the Keuthan Foundry of Middletown, Ohio, production bottlenecks were limiting output to less than eight tons a day.

Then the foundry installed a Speedmullor-Preparator Unit to thoroughly mull and prepare all of the foundry's molding sand, and a Sandslinger to ram the bulk of the foundry's molds. The cost of this mechanization was surprisingly low . . . yet capacity at Keuthan Foundry has been *doubled!* Quality is up and costs are down!

Whether you operate a small or large foundry, you can't afford to pass up the production boosting, cost-cutting possibilities of Sandslingers and Speedmullor-Preparator sand conditioning and mulling units. Write today for complete information on this equipment! Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 North Cicero Avenue, Chicago 39, Illinois.



A Speedmullor-Preparator Unit thoroughly conditions and mulls all of Keuthan's sand.



This Stationary Sandslinger quickly and efficiently rams a majority of Keuthan's molds.

The 1953

NITE-GANG

provides more important features!

- ✔ An automatic cable reel swivels in any direction eliminates dragging cable.
- ✔ High capacity Screenarator unit with wear surfaces borium coated. High efficiency screw conveyor with borium coated edge.
- ✔ Elevator sprocket and chain bushing of special high alloy steel.
- ✔ A full 24 to 1 speed ratio—speed infinitely variable
- ✔ Centralized lubrication for conveyor screw bearings takes guesswork out of maintenance.
- ✔ Screenarator unit rotates a full 240 degrees on hardened and ground bearing plates—sand may be directed where you want it.
- ✔ Tramp iron and shot separation by permanent magnet—no rectifier required.
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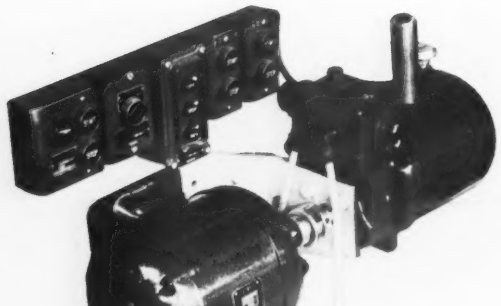

Elevator tilts hydraulically assuring easier, faster operation with no operator fatigue. Screw conveyor and elevator are spring loaded for trouble-free operation.

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FEMA

Look to the 1953 Nite-Gang for *complete* low-cost floor sand conditioning! This one machine self propels—self loads without prior windrowing—blends—magnetically separates—breaks lumps and screens—double aerates—windrows or piles. Write today for Nite-Gang Bulletin giving complete details. Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 North Cicero Avenue, Chicago 39, Illinois.

(*Concluded from page* 190)

allowable.

4. Duraluminum has the disadvantage of being the most expensive pattern material used at Convair, but is economically preferable for fabricating a tool that must withstand considerable abuse over a long period.

Similarly, where the facilities of the pattern shop alone are inadequate for the efficient fabrication of tooling components, patternmakers are expected to utilize the service of personnel in other Convair departments. Splash casts, for instance, may be requisitioned from the plaster shop; and when dural patterns cannot be machined from stock materials, inexpensive wood masters may be fabricated for use by the foundry in sand-casting metal tools.

An extremely large amount of floor space was provided for the new pattern shop because it seemed more than likely that future production requirements will necessitate the employment of more patternmakers. The floor plan of the shop is intended, therefore, to allow sufficient work space for all men who may be hired in the next year or two as well as for the present crew, which works two shifts daily.

FOUNDRY Index Ready

Index to FOUNDRY, Volume 80, listing by title, subject matter and author the editorial material published during 1952, is available for distribution. Subscribers may obtain copies on request.

Work benches and tables are arranged in an orderly manner so that each will be fully accessible without taking up any more space than actually is needed to get a certain type of job done. Lathes, drill presses, joiners, planers, mills, power saws, and other machine tools are situated so that they can be reached with minimum effort by a patternmaker from any given station without interrupting work that is being done at adjacent stations.

Substantial amounts of empty floor space are provided for the assembly of large tooling structures. A freight elevator has been located in one corner of the shop (situated on the second floor of a two-story building) so that raw materials can be conveyed to stockrooms and finished tools can be removed from work areas without confusion.

Although dimensional tolerances of plus-minus 0.010-in. are consistently maintained by Convair patternmakers, it is estimated that the overall cost of tools made by the shop averages only $4.50 per man-hour (14 to 196 man-hours normally being required to fabricate a single tool).

This figure compares very favorably with the man-hour cost of routine production operations in an aircraft factory and is attributable to the following factors:

1. The spirit of competition among men who work as individuals rather than as members of a team tends to reduce the amount of time that is wasted ordinarily in the course of a day's production work.

2. Skilled patternmakers, capable of assuming full responsibility for their work, do not require the careful supervison that is essential to efficient production work.

3. Losses due to accidents, spoilage and rejections are relatively insignificant, not only because patternmakers are skilled, but because they have a personal interest in their work.

4. Convair officials have done a good job in providing shop facilities and working conditions that enable patternmakers to perform with maximum efficiency.

SAVE TIME

You can cut down the time for loading, unloading and moving hard to handle materials . . . and make a direct saving of hand labor. Whatever your job, STEARNS Lifting Magnets will help you save time and money.

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STEARNS Lifting Magnets are being successfully and profitably used in handling scrap iron, steel plates, coils, bundles, strip steel, rails, slabs, billets, pig iron, castings, borings, turnings as well as finished products. The problem of loading or unloading . . . or moving large quantities of material quickly at a low cost — easily solved with STEARNS Lifting Magnets.

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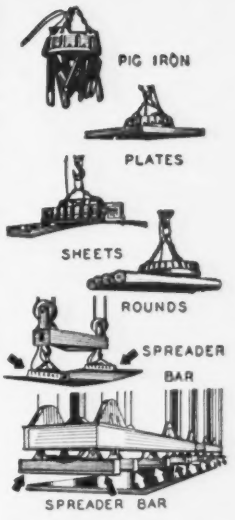

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With no heat treatment or age hardening, ALMAG 35 possesses the highest, most stable combination of strength, ductility, corrosion resistance, shock resistance, and dimensional stability of any related alloy.

Before you specify ANY alloy . . . REQUEST NEW BULLETIN 350.

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P. O. BOX 230
AURORA, ILLINOIS

PATTERNS—Their Relation To Castings Production

Part IV

ABC of Foundry Practice

By T. H. TREVITHICK

WHILE the pattern forms the outside of the mold cavity, cores form any desired cavities in the resulting casting. Many castings do not require cores of any kind. Many castings utilize green sand cores. In another type of casting, the number and intricacy of the cores and the time spent in their preparation and assembling constitute the most important link in the sequence chain commencing in the drawing office and ending at the casting shipping dock. Since the cores form any necessary hollow places in a casting, it is obvious that the patternmaker has not completed the full pattern equipment until he has made any or all the coreboxes required for any given job.

In many cases, where more than one man works on a given job, the coreboxes are constructed in parallel with the pattern. If a man works alone, it is customary to complete the pattern before making the coreboxes. This affords him the opportunity to compare and fit his coreboxes to the core prints on the pattern. This is just another check for accuracy and the assurance that the core will fit and be properly supported in the mold.

The foregoing comment refers to cores that form the interior of castings. The term also is applied to any body of baked sand made from a core sand mixture and applied to form part of the outside surface of the mold. In the accompanying illustration, Fig. 7, the core *A* fills an impression made by a core print between the projecting part of the pattern and the joint. This arrangement facilitates making the entire mold in the drag, instead of making a parting and coping down for the flange or lug.

In the bracket shown at *C* the ribs are above and below the center line of the split pattern. Molding procedure is simplified by attaching a core print to one rib and providing a dry sand core to fit the print.

Corebox construction and method of making cores presents an interesting study whether the cores are destined for inside or outside application. When an extrusion type machine is not available, round or cylinder-shaped cores are made on end in split coreboxes, then turned to a horizontal position. The upper half of the box is removed and the core is rolled out on a flat plate. If extreme accuracy is a factor, the core is deposited in a dryer shell. Large cylindrical cores are made in halves, then dried and pasted.

A skeleton corebox is made up of a frame and two semicircular end pieces. The device is filled with rammed sand to the approximate size and shape. Surplus sand is removed by a strike or strickle riding either on the two end pieces or on the frame. Two of these half cores are made and dried, then joined to form the complete core.

Pipe shops are the principal users of long cylindrical cores swept on core bars, arbors or barrels. In small installations the barrels are revolved by hand. In the big production shops the barrels are actuated by a belt-driven clutch. A thickness of green sand is swept on the barrels for soil pipe and short pressure pipe up to about 6 ft. For the long lengths, 14 to 18 ft, the barrel first is covered with a hay or straw rope or a length of corrugated paper specially provided for the purpose. This soft interior facilitates contraction of the casting, also facilitates exit of the gas through the numerous vent holes in the barrel. A rough coating of loam applied to the hay, straw or paper rope is reduced to the correct shape and diameter by a horizontal sweep attached to a suitable support and with the cutting edge in line with the center line of the core. A finish coat is applied later. The core may be straight and uniform in diameter, or in special cases steps of different diameters may be formed as shown at *D*, Fig. 7.

Large coreboxes of uniform shape usually are constructed of staves and segments. The general form is made on the frame, with allowance for the thickness of the staves. This type of construction is shown at *B*. Segments are built up in curves and sawed to the approximate size and afterward finished to size by hand.

Irregular shapes and small boxes generally are carved by hand. Coreboxes are jointed in a similar way to patterns. The same general principle—easy draft—always is regarded as a main factor.

Before a large corebox is delivered to the foundry the patternmaker designates which will be the cope side when the core is placed in the mold. This information will serve as a guide

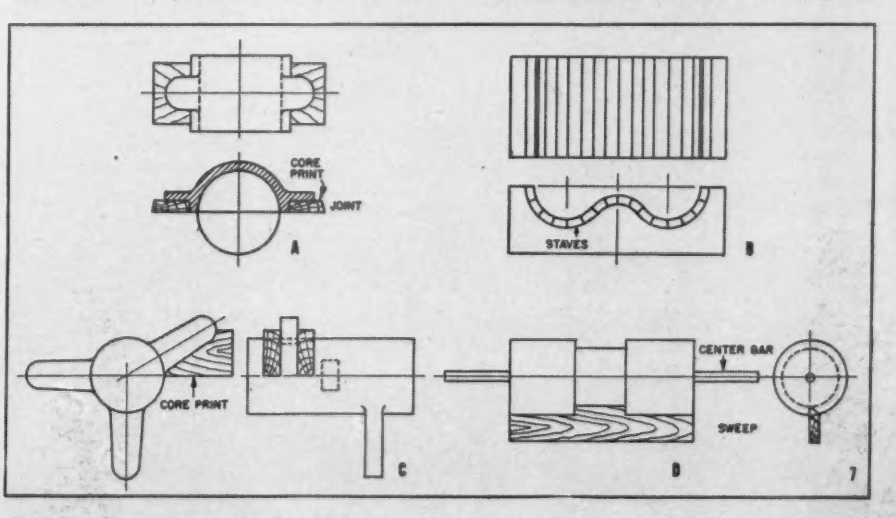

Fig. 7—The core *A* facilitates making entire mold in drag. Core *C* simplifies molding bracket with ribs above and below joint. Plain or stepped cores may be swept on central arbors as shown at *D*. Typical construction of a large corebox made up of staves and segments is illustrated at *B*

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to the molder and coremaker in arranging the vent openings and the position of the lifting hooks.

Designers and draftsmen generally believe that no cores are necessary in bores that finish under 2 in. They favor drilling the hole through solid metal. As pointed out previously, sometimes it is necessary to core below this size to overcome shrinkage in a solid section, especially where the solid metal adjoins a thin section, as for example where a wheel arm joins the hub or rim.

Small square coreboxes are made out of the solid and usually jointed diagonally or across the corners as shown at *E*, Fig. 8. This, of course, gives ideal draft. Large square coreboxes are constructed on the frame

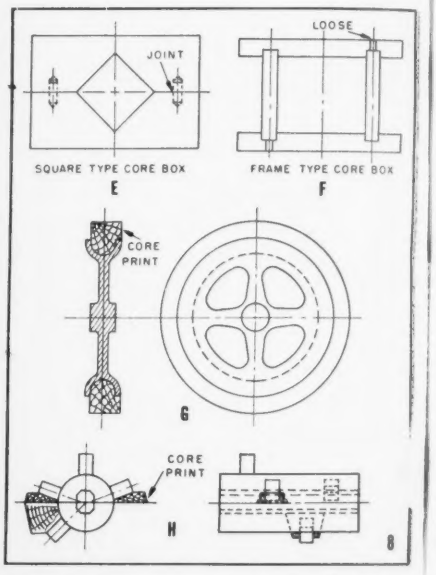


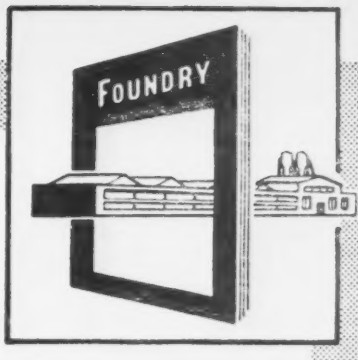
Fig. 8—*E*, square type corebox, is jointed across corners. *F*, frame type corebox, is made to come apart. Core forms groove in sheave wheel *G*. Part of mold face is formed by dry sand cores as shown at *H*

plan. The ends are let into the sides with opposite arms arranged to come apart (*F*, Fig. 8). Loose pieces or projecting members are *picked out* after the box has been removed from the core.

In the construction of a large corebox the patternmaker makes sure that the walls are sufficiently strong to resist the ramming and prevent the sides from bulging. The box also must be braced to resist the rapping, rolling over and lifting away from the core. Large coreboxes may be clamped or bolted while in service. In some instances the corebox is handled as a single unit. In other instances the box may include several components which have to be assembled and taken apart each time a core is made.

Fillets on the casting are formed

(*Concluded on page* 199)



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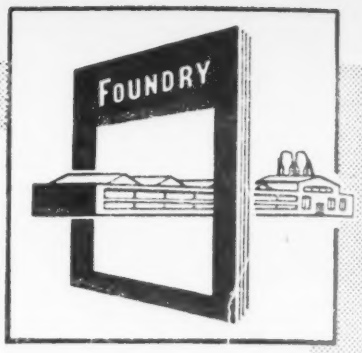

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(*Concluded from page* 196)

by round corners on the cores. Usually the patternmaker places the fillets in the corebox where two sides come together. Sometimes a fillet has to be formed on top of an open square corebox. The fillet may be cut or filed away, or formed with a strickle. The former method is unsafe when left to the discretion of the coremaker. He may cut the corner too large or too small, or more probably forget to cut it. On inexpensive patterns for one or two castings it is customary to paint the corebox corners to indicate that a fillet is required. Width of the painted line represents the radius of the fillet.

The sheave pattern *G* illustrates the use of a core for forming part of the outside face of a casting. The rim core is formed in a single corebox or in a segment box, depending on the diameter of the casting. This method simplifies the molding practice considerably and is probably the most economical of the ten accepted methods of molding sheave wheels. The method also is applicable to certain other castings.

Small and large slab cores sometimes are employed instead of a rammed up cope to cover certain molds. While all these are known in the shop language as cores, because they are made in coreboxes and baked in the oven, the name is not strictly accurate and may convey the wrong impression to the uninitiated. Actually they constitute forms of dry sand molding. In certain instances the entire mold, inside and outside is built up with cores.

(*To be continued*)

Offer Cobalt-60 Training

A two-day training course designed to provide basic knowledge needed to utilize Cobalt-60 sources in industrial radiography is being offered by Tracerlab Inc., 130 High St., Boston, Mass. Cobalt-60 has come into increasing use as a nondestructive testing means, but industry often has been unable to obtain competent radiographers skilled in the use of gamma radiation.

The course of study covers such topics as radiological safety, handling of sources, techniques of exposure, the use of films and screens, use of radiation meters, actual practice in exposing, developing and evaluating film and other pertinent aspects of industrial radiography.

Inquiries concerning the program should be directed to either the above address in Boston or to Tracerlab Inc., 2295 San Pablo Ave., Berkeley, Calif., where the same program will be given.

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Activities of Foundry

GROUPS

Philadelphia

AT the Nov. 14 meeting of Philadelphia Chapter of the AFS, T. F. Kiley, Meehanite Metal Corp., New Rochelle, N. Y., was the principal speaker. W. R. Ferrell, DeLaval Steam Turbine Co., Trenton, N. J., was technical chairman and led the discussion of Mr. Kiley's paper at its conclusion.

Mr. Kiley discussed the various hazards that influence quality of iron castings as a result of variations in gating and risering. His analysis of casting defects that could be attributed to variations in the molding technique was extensive and his aims at simplification of this complex subject were carried out very well.

The speaker illustrated his talk with numerous slides showing variations in the gating and risering of simple molds, together with rules and tables from which correct sizes could be computed. He dealt primarily with small to medium size castings, and the production of large castings was discussed only briefly.

The discussion period included statements regarding effectiveness of risers and the selection of the proper location of gates and risers. It also was pointed out that high-strength irons have great shrinkage which necessitates more or larger risers. It was pointed out that a common error is to attempt to eliminate shrinkage type defects in low-tensile, expanding type irons by increasing riser size whereas these defects are more readily eliminated by chilling. —*D. E. Best, Bethlehem Steel Co.*

Northwestern Pennsylvania

NOVEMBER meeting of Northwestern Pennsylvania Chapter of the AFS was held in conjunction with the American Materials Handling Society at the Erie Moose Club, Erie, Pa. Earl Strick, Erie Malleable Iron Co., introduced Kennard Lange, sales manager, Link-Belt Corp., Chicago, who was the featured speaker. Mr. Lange's topic was "Material Handling in the Foundry."

Having worked in a foundry at one time, Mr. Lange is well versed on the subject from a "having done" standpoint. He outlined old and new methods of handling materials from the time the raw materials are brought into the plant until the finished castings leave the shipping room. He followed this with slides showing the application of various types of equipment for the operations discussed.—*Roy A. Loder, Erie Malleable Iron Co.*

Saginaw Valley

TECHNIQUES and Developments in Shell Molding" was the topic for discussion at the Dec. 4 meeting of Saginaw Valley Chapter of the AFS held at Frankenmuth, Mich. Speakers were William Rose, Borden Co., Russell LeBeau, Sutter Products Co., and Vaughan C. Reid, City Pattern Foundry & Machine Co. Kenneth Packer, University of Michigan, acted as moderator and Paul W. Olson, Eaton Mfg. Co., was technical chairman.

Mr. Reid discussed pattern equipment and production techniques. He stressed the importance of close cooperation between the shell mold foundry and the casting designer, of having patterns made of materials that are stable at high temperatures, of having patterns of uniform thickness to maintain uniform pattern temperatures, and of having a high degree of polish on the pattern surface.

Mr. Rose discussed recent developments in resins and sands. He indicated that satisfactory molds are being made with sands varying in AFS fineness from 80 to 180 and with

(*Continued on page* 202)

NORTHEASTERN OHIO Chapter of the AFS attracted a capacity crowd to its annual Christmas party in the Rainbow Room of the Hotel Carter, in Cleveland, on Dec. 11. A few of the 1000 members and guests who attended are shown above. Photos by Tom Gallagher, Lake City Malleable Co.

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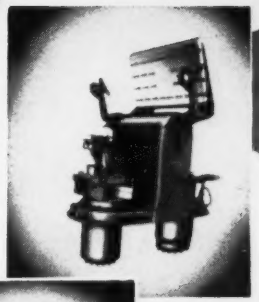
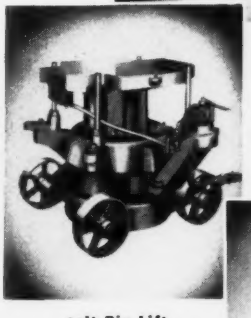


Jolt Rollover Draw, Model A



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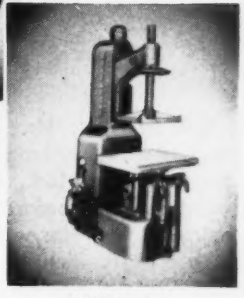

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PHILADELPHIA Chapter of the AFS heard T. F. Kiley, Meehanite Metal Corp., New Rochelle, N. Y., discuss gating and risering of iron at the Nov. 14 meeting. Left to right are G. H. Bradshaw, U. S. Naval Shipyard, Philadelphia, past chairman; W. R. Ferrell, DeLaval Steam Turbine Co., Trenton, N. J., technical chairman; Mr. Kiley; W. B. Coleman, W. B. Coleman & Co., Philadelphia, secretary-treasurer; and J. M. Robb Jr., Hickman, Williams & Co., Philadelphia. Photograph by courtesy of Leo Houser, Dodge Steel Co., Philadelphia

(*Continued from page* 200)

resin quantities varying from 5 to 9 per cent. It was pointed out that gating and risering techniques are important, that one inexpensive means of shell mold assembly is by gluing with heat and pressure, that stacking of molds by grinding or hot back molding is an important process, and that the so-called "wet method" produces molds of high permeability and strength in a short investment time, but that certain safety hazards are involved.

Mr. LeBeau discussed the latest shell mold equipment and listed three basic requirements for such equipment. First, it must be of rugged design. Second, it must have flexibility and ease of operation incorporating quick adjustments for pattern temperature, investment time, curing time and curing temperature. Third, it must give high production at low cost. It was indicated that single station machines are generally most practical and economical at present.—*Roy S. Dahmer, Eaton Mfg. Co.*

Eastern New York

FIFTH annual stag Christmas party of Eastern New York Chapter of the AFS was held Dec. 16 at Circle Inn, Lathams, N. Y. The attendance of more than 200 far exceeded expectation and was in sharp contrast to the 34 who braved a blizzard to attend the 1951 affair. Those unable to attend last year seemed to doubly enjoy themselves this year since at 2 o'clock the clan was still gathered and going strong. —*Allan J. Kiesler, General Electric Co.*

Metropolitan

AT the Nov. 10 meeting of Metropolitan Chapter of the AFS, Lewis H. Gross, metallurgist, American Radiator & Standard Sanitary Corp., Baltimore, spoke on, "Improving Cupola Operations through Laboratory Control." Technical chairman was Charles M. Schwalje, general superintendent of foundries, Worthington Corp., Harrison, N. J. Meeting was held at the Essex House, Newark, N. J.

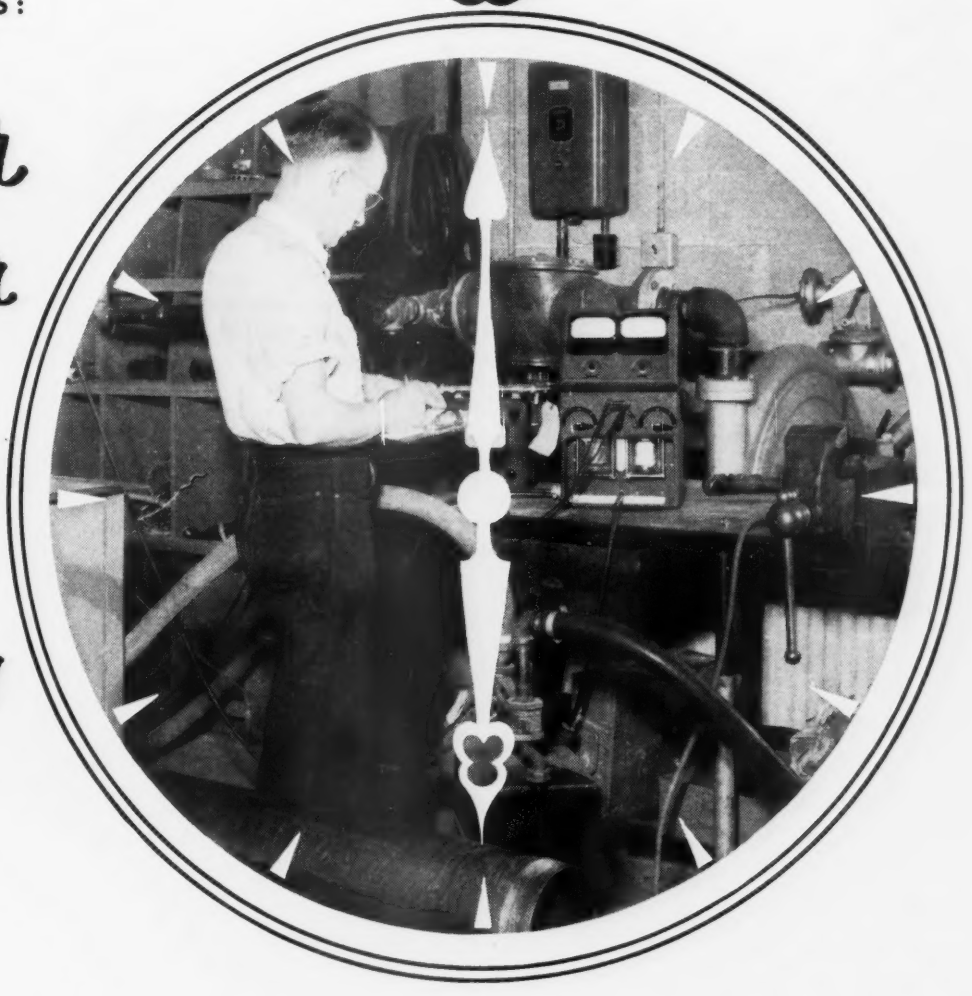
Mr. Gross stressed the importance

(*Continued on page* 204)

CHICAGO Chapter of the AFS heard Walter Bonsack, vice president, Christiansen Corp., Chicago, discuss gating. Above, top left, from left to right, are Walter Moore, Burnside Steel Foundry Co., Chicago; Chapter Chairman John Owen, Chicago district sales manager, Harbison-Walker Refractories Co., Pittsburgh; Prof. Robert Kennedy, University of Illinois, and Mr. Bonsack. Top right, guest B. L. Baptist, superintendent of foundries, Beloit Iron Works, Beloit, Wis., second from right, enjoyed dinner with a group of Chicago area foundrymen. Bottom left, left to right, Mr. Bonsack, John Rassenfoss, chapter vice chairman, American Steel Foundries, East Chicago, Ind., and Morris Berger, Armour Foundation, chat before the meeting. Bottom right, enjoying the dinner entertainment, from left to right, are J. F. Rizner and Edward Bejcik, Swan-Finch Oil Corp., Chicago; Louis Wick, Aluminum Alloys Co., Chicago, and Robert Starek, Swan-Finch. The pretty accordionist is Agnes Sampson. Photos are by courtesy of I. H. Dennen, Beardsley & Piper Division, Pettibone Mulliken Co., Chicago

ECLIPSE FUEL
ENGINEERING WRITES:

"Heat Prover Completed a 30 Hour Burner Test In Just 6 Hours!"



Amazing Cities Service Heat Prover Works 5 Times As Fast As Old Method... More Accurate, Too!

Robert W. Pixler, Laboratory Supervisor for Eclipse Fuel Engineering Company, Rockford, Illinois writes:

"It did not seem possible that an instrument that is so fast and direct-reading could possibly have the accuracy we demand. But, we found the Heat Prover equally exact, possibly even more exact, than standard commercial testing equipment.

"Our test work with previous instruments was a long, drawn-out affair. But with the Heat Prover, we completed what would normally have been a 30-hour test in just 6 hours! ...and we doubt that our old equipment could have maintained the accuracy delivered by Cities Service Heat Prover."

WHEREVER A FURNACE OPERATION IS INVOLVED, the Heat Prover can help increase productivity by providing:

- **Rapid, continuous sampling**
- **Simultaneous reading of oxygen and combustibles**
- **Direct measurement of oxygen and combustibles**
- **Easy portability**
- **No maintenance; no re-calibration**

For details, contact nearest Cities Service office or write Cities Service Oil Company, Dept. B23, Sixty Wall Tower, New York City 5, N.Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

NORTHWESTERN PENNSYLVANIA Chapter of the AFS held its November meeting in conjunction with the American Materials Handling Society. In the scene above, left to right, are Cliff Kleinknect, Buffalo representative, Link Belt Co., Chicago; Vice Chairman Charles Gottschalk, Cascade Foundry Co., Erie, Pa.; Ed Gustafson, vice president, Northwestern Pennsylvania Materials Handling Society; Chairman Fred Carlson, Weil-McLain Co., Erie; K. F. Lange, Link-Belt Co., and Educational Chairman Earl Strick, Erie Malleable Iron Co., Erie

(*Continued from page* 202)
of laboratory control in foundries of all sizes, emphasizing the importance of close co-operation in order for the laboratory to evaluate and transmit information to the shop operating departments. He then summarized important phases of good cupola practice and presented some valuable pointers on practical operating conditions.

Preceding the main address, H. Charles Esgar, staff assistant, Foundry Educational Foundation, discussed and summarized with the aid of slides, the FEF program for the past five years.—*W. T. Bourke, American Brake Shoe Co.*

Wisconsin

ANNUAL Christmas party of Wisconsin Chapter of the AFS was held at Hotel Schroeder, Milwaukee on Dec. 12. There were 700 members and guests on hand to enjoy the festivities, which featured dinner and a one-hour floor show. Chapter President Joseph G. Risney, Risney Foundry Equipment Co., announced details of the chapter's 1953 regional conference to be held Feb. 12-13. A. F. Pfeiffer, Allis-Chalmers Mfg. Co., is conference chairman, R. V. Osborne, Lakeside Malleable Co., co-chairman and Prof. E. R. Shorey and Prof. George Barker, University of Wisconsin, are associate chairmen.—*John E. Hubel*

EASTERN NEW YORK Chapter of AFS enjoyed its fifth annual Christmas stag party Dec. 16. Top view, Lasalle Wheatley, General Electric Co., on left, is receiving the door prize. Fred Rothery, Bay State Refractories, is in center, and Charles Kilmer, Swan-Finch Oil Corp., on right. Below, smorgasbord

Rochester

BECAUSE of bad weather and inability to make plane connections, S. C. Massari, technical director of AFS was unable to be present at the Dec. 2 meeting of Rochester Chapter of the AFS. Max T. Ganzauge, a past chairman of the chapter and superintendent of General Railway Signal Co., Rochester, N. Y., was an excellent substitute. He had just returned from an extensive stay in Turkey where he had served as a foundry consultant to the Turkish government.

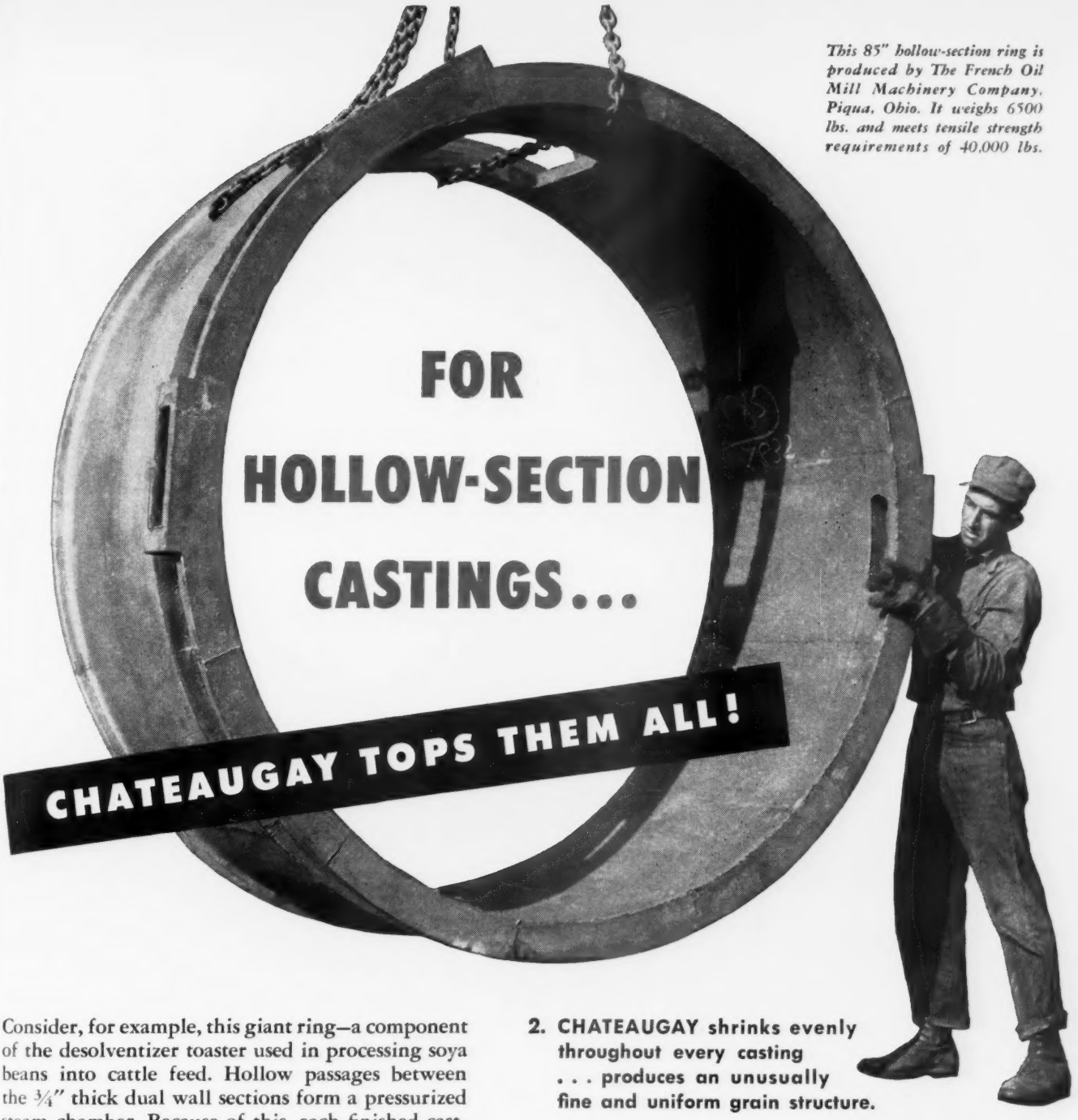
M. T. GANZAUGE

Mr. Ganzauge found that language was quite a barrier since there is no relationship between the Turkish tongue and any of the European. He found that prior to World War II, most of the country's industrial and army leaders were German trained. However, the young men of Turkey today are American trained. Although little is known about Turkey by the average American, it is the strongest nation in the Middle East, is solidly anticommunist and has a great future as being a reliable friend of the United States.

At present four steel foundries, 12 gray iron foundries and a number of small brass and bronze foundries are operating in the country. Small foundries have developed because organizations employing ten or more employees are taxed. A nonferrous molder in Turkey makes approximately 35 cents an hour while those for gray iron are paid by the pound, and the rate is 7 cents. Foundry managers receive approximately $250 per month.

Most Turkish foundry workers are accustomed to oldtime methods and ways of producing castings. Mr. Ganzauge believes the Turkish foundry industry needs trained practical foundry foremen and engineers to acquaint workers with use of modern

(*Continued on page* 207)



This 85" hollow-section ring is produced by The French Oil Mill Machinery Company, Piqua, Ohio. It weighs 6500 lbs. and meets tensile strength requirements of 40,000 lbs.

FOR HOLLOW-SECTION CASTINGS...

CHATEAUGAY TOPS THEM ALL!

Consider, for example, this giant ring—a component of the desolventizer toaster used in processing soya beans into cattle feed. Hollow passages between the ¾" thick dual wall sections form a pressurized steam chamber. Because of this, each finished casting must undergo a 300 psi water pressure test before passing code inspection.

Here are the reasons why CHATEAUGAY, Republic's *exclusive* premium pig iron, is used in this application:

1. **CHATEAUGAY is an exceptionally fluid iron . . . cools evenly . . . fills adjoining light and heavy sections completely.**
2. **CHATEAUGAY shrinks evenly throughout every casting . . . produces an unusually fine and uniform grain structure.**
3. **CHATEAUGAY castings machine readily.**

Whether or not you use CHATEAUGAY Pig Iron, a Republic Pig Iron Metallurgist will be glad to help you get top production from your present facilities. Just let us know when you would like to see him.

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Republic **PIG IRON**

"CHATEAUGAY" Low-Phosphorus, Copper-Free

"REPUBLIC" (Northern) Foundry, Basic and Malleable

"PIONEER" (Southern) Foundry and Basic

REPUBLIC STEEL

HAND PROTECTION

"Here's a swell welder's glove, Joe!"

Yes, it's

AO HEAVY DUTY HORSEHIDE

Best for Flexibility, Heat Resistance, Wear

"Shake hands" with AO's "super" line of hand protection for welders. Each glove and mitten is 14" long . . . has a smooth finish . . . improved heavy weight soft lining on back for greater protection . . . quality edges bound with tape and stitched. These are features which make this chrome-tanned *horsehide* line better than ever. Test them on the job. *See* the difference! *Feel* the difference! Your nearest AO Safety Products Representative can supply you.

TX100 Gunn cut—one piece back. Double thickness of leather on first finger and thumb, also on portion of palm. Lined on back from wrist to finger-tips.

5X163 Gives exceptional resistance to heat on gas welding and heaviest amperage electric welding. One-piece back and palm. Welted at all vulnerable seams. Extra heavy lining on back of hand.

TX200 Gunn style. Standard size (11) also sizes 10, 12. Welted seam at base of palm and wrist. One-piece back. Wing thumb.

6X141 One-piece back and palm. Crotch of thumb reinforced with wide leather strap. All vulnerable seams welted for extra protection. Back of hand is lined.

Also ask to see and test the other six gloves and mittens in this top quality AO line.

American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

(*Continued from page* 204)

equipment. Increased productivity is essential to raising the standard of living of the Turkish people and to meet defense production requirements. He also believes foundry equipment manufacturers should find there an increasing market for their machinery.—*H. G. Stellwagen, Hetzler Foundries Inc.*

Southern California

THE 16th annual Christmas stag party of Southern California Chapter of the AFS was held at Lakewood Country Club, Long Beach, Calif., on Dec. 13. More than 500 foundrymen and their guests were on hand to enjoy the evening's entertainment. The entertainment committee, with Robert Ditmore as chairman, was given well deserved applause for the excellent variety program provided.—*K. F. Sheckler, Calmo Engineering Co.*

Connecticut Non-Ferrous

ELECTION of officers for 1953 was held during the Dec. 17 meeting of the Connecticut Nonferrous Foundrymen's Association. Newly elected president is Stafford W. Chappell, Electric Boat Division, General Dynamics Corp., Groton, Conn.; vice president, Chester Witters, Consolidated Industries Inc., West Cheshire, Conn.; treasurer, Fred Bundy, Jenkins Bros. Co., Bridgeport, Conn.

NORTHERN CALIFORNIA Chapter of the AFS was addressed Dec. 12 by E. B. Rich, general sales manager, American Wheelabrator & Equipment Co. Above, left to right, are Program Chairman W. S. Gibbons, Ridge Foundry, San Leandro, Calif.; President G. W. Stewart, East Bay Brass Foundry, Richmond, Calif.; Mr. Rich; Secretary Davis Taylor, American Wheelabrator & Equipment Co.

Louis G. Tarantino, Niagara Falls Smelting & Refining Division, Continental Copper & Steel Industries, New Haven, Conn., was re-elected secretary; and John V. McCarthy, North American Smelting Co., Needham, Mass., was re-elected technical secretary.

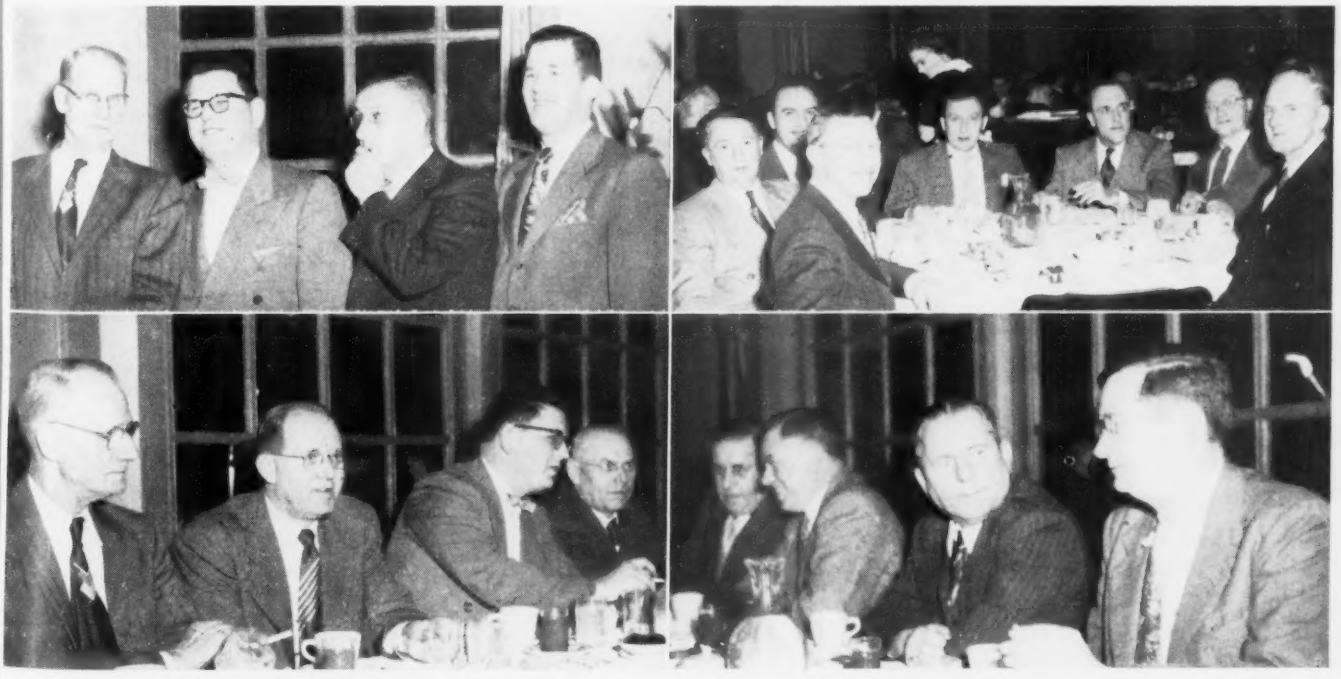
Newly elected executive committee includes: Owen Johnson, H. B. Ives Co., New Haven; T. Joseph Judge, Jenkins Bros. Co., Bridgeport; J. J. Shannon, Jenkins Bros. Co.; S. W. Chappell Sr., New London, Conn.; and W. J. Kenney, Knapp Foundry Co. Inc., Guilford, Conn.

Technical feature of the evening was a roundtable discussion under the leadership of Stafford W. Chappell.—*Louis G. Tarantino, Niagara Falls Smelting & Refining*

Northern California

THE Dec. 12 meeting of Northern California Chapter of the AFS was held at Hotel Leamington, Oakland, Calif. George Stewart, East Bay Brass Foundry, Richmond, Calif.,

(*Continued on page* 210)

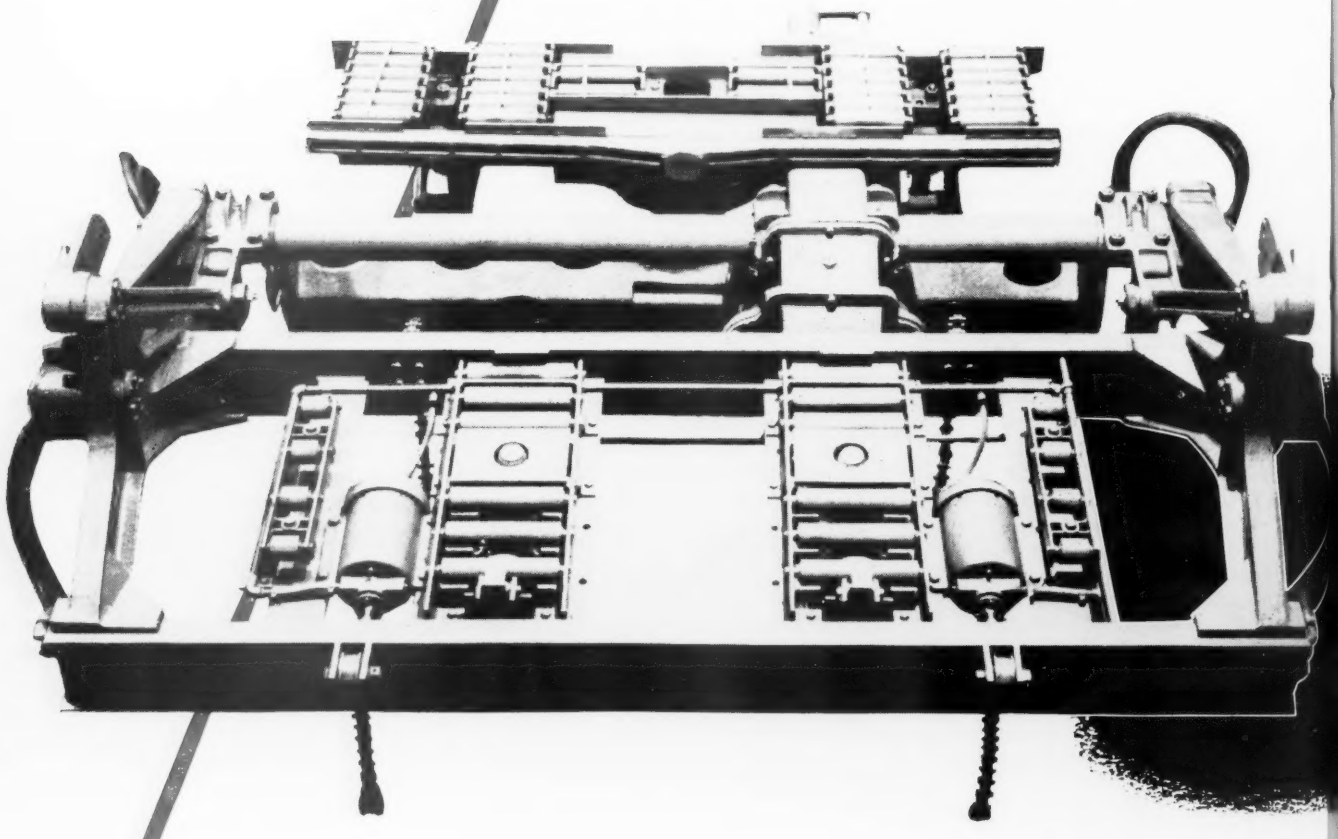


PINE STATE FOUNDRYMEN'S ASSOCIATION members enjoyed their annual Christmas party Dec. 11. Top left, left to right, are the group's officers for '53: Clyde Lake, Hyde Windlass Co., Bath, Me., president; William Kemp, Portland Co., Portland, Me., vice president; Harlan Penney, J. W. Penney & Sons Co., Mechanic Falls, Me., treasurer, and James Hamblin, Saco-Lowell Shops, Biddeford, Me., secretary. Top right is a group from Saco-Lowell Shops. Both bottom views show the speakers table

NO. 2 OF A SERIES

These comparatively new Herman Charging Conveyor Type Machines are extremely popular, whether operated in molding departments or core departments. They work equally well with either a Jolt machine or Sandslinger.

A versatile, rugged machine, it is produced in our broad range from 500 to 20,000 lb. rollover capacities.



HERMAN MOLDING MACHINES MA

A typical core department cycle of operations is as follows:

1. Core box filled with sand and placed on the jolt unit.
2. Power lift conveyor lowers box on sub-plate.
3. Core box is jarred and elevated by power lift conveyor to standard conveyor level.
4. Box goes to Charging Conveyor Rollover and Draw Machine, manually or by pusher mechanism.
5. Pneumatic core box and core plate clamps engage rammed core box for rollover operation.
6. After rollover, core clamps are disengaged and slow draw operation starts.
7. Vibrators separate bond between core box and sand.
8. Fast draw operation checked by speed control device and core box gently deposited directly on discharge conveyor and rolled away on companion conveyor.
9. Inverted turnover plate and core box rolled back to upright position, pneumatic clamps disengaged and box returned to either jolt station or storage.
10. Another rammed core box should, of course, now be at the Charging Conveyor Rollover and Draw Machine for the production of another core.

Herman Charging Conveyor Rollover and Draw Machines are extremely flexible. Each machine is capable of producing a large range of sizes in either your molding or core department.

Send for further information today.

There is a type and size Herman Molding Machine for all foundry operations.

Here is the HERMAN Charging Conveyor Rollover and Draw Machine

MAKEIR WAY BY THE WAY THEY'RE MADE

Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

SAGINAW VALLEY Chapter of the AFS met Dec. 4 to discuss shell molding. Left to right are William Rose, Borden Co., New York, speaker; Russell F. LaBeau, Sutter Products Co., Dearborn, Mich., speaker; Vaughan C. Reid, City Pattern Foundry & Machine Co., Detroit, speaker; Kenneth Packer, University of Michigan, moderator; Chairman Kenneth Priestley, Vassar Electroloy Products Inc., Vassar, Mich.; Vice Chairman James MacDonald, Central Foundry Division, GMC, Saginaw, Mich.; Technical Chairman Paul Olson, and Woodrow Holden, Eaton Mfg. Co., Saginaw

(*Continued from page* 207)
presided and E. B. Rich, general sales manager, American Wheelabrator & Equipment Co., Mishawaka, Ind., was the featured speaker. His topic was entitled "The Future of Our Industry."—*Clayton D. Russell, Phoenix Iron Works*

New England

THE Dec. 10 meeting of the New England Foundrymen's Association was held at Hotel Shelton, Boston. There were 100 members and guests present and association president, Frank R. Elliot, Westinghouse Electric Corp., Springfield, Mass., presided. A nominating committee consisting of W. Saunders, R. Walker and L. Wright was appointed to present a slate of officers for election at the annual meeting.

Principal speaker was C. E. Herington, Meehanite Metal Corp., New Rochelle, N. Y. Mr. Herington has been associated with the foundry industry since 1938, most of that time being in charge of sales engineering development for Meehanite foundries in the United States and Canada. He stated there are about 130 foundries licensed to produce Meehanite castings, of which 50 are in the United States and Canada. He presented a sound motion picture, "Meehanite Means Better Castings," which illustrates the applications of Meehanite castings in industry.—*Myron DeHollander, General Electric Co.*

Central Illinois

SEVENTH annual Christmas party of Central Illinois Chapter of the AFS was held Dec. 13 at the American Legion Hall, Peoria, Ill. A capacity crowd of 450 was present for the party at which dinner, vaudeville entertainment and dancing were featured.—*L. E. Kinsinger, Caterpillar Tractor Co.*

Pine State

ANNUAL meeting of the Pine State Foundrymen's Association, held Dec. 11 at Hotel Falmouth, Portland, Me., was also the group's Christmas party. There were 110 members and guests present to enjoy the festivities.

Officers to serve during 1953 were elected and are: President, Clyde Lake, Hyde Windlass Co., Bath, Me.;

(*Continued on page* 212)

CENTRAL ILLINOIS Chapter of the AFS held its seventh annual Christmas party Dec. 13. Top view shows, left to right, L. G. Gunn, Caterpillar Tractor Co., Peoria, Ill.; Mrs. Gunn, and Mrs. Howard Jones, Peoria. Standing, distributing the ladies' gifts, is R. N. Bryant, Caterpillar Tractor Co. Bottom left are, left to right, O. S. Smith, Smith Oil & Refining Co., Rockford, Ill.; A. V. Martens, Pekin Foundry & Machine Co., Pekin, Ill., and Mrs. Martens. In the right view at the bottom, also left to right, are Mrs. Walter L. Seelbach, Mrs. F. W. Shipley, and Walter L. Seelbach, Superior Foundry Inc., Cleveland, former president of the AFS. Photographs by F. L. Brosmer, editor, employee publications, Caterpillar Tractor Co., Peoria, Ill.

VANCORAM PRODUCTS

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
ALUMINUM ALLOYS		
Alsifer	Aluminum ..... 20% Silicon ..... 40% Iron 40%	Used principally as a steel deoxidizer and for grain size control.
Deoxidizing Grades	Aluminum .... 85 to 99%	Standard grades.
Silicon Aluminum	Silicon ..... 5 to 20% Aluminum ..... Bal.	For sand, permanent mold and die casting.
Titanium Aluminum	Titanium .... 2½ and 5% Aluminum ..... Bal.	For grain refinement and improved physical properties of commercial aluminum alloys.
Vanadium Aluminum	Vanadium .. 2½, 5, 10% Aluminum ..... Bal.	For control of thermal expansion, electrical resistivity, and grain size of commercial aluminum.
BORON ALLOYS		
Ferro Boron	Boron ..... 14/18% Carbon ..... 1.50% Silicon ..... max. 5.00% Aluminum .. max. 0.10%	For adding boron to steels and irons.
Vanadium Grainal No. 1	Vanadium ..... 25.00% Aluminum ..... 10.00% Titanium ..... 15.00% Boron 0.20%	Practical and economical intensifiers for controlling and increasing the capacity of steels to harden, and for improving other important engineering and physical properties.
Grainal No. 79	Aluminum ..... 13.00% Titanium ..... 20.00% Zirconium ..... 4.00% Manganese ..... 8.00% Boron ..... 0.50% Silicon 5.00%	
CHROMIUM ALLOYS		
Ferro Chromium Briquettes	Hexagonal. Weigh approx. 3⅜ lb., contain 2 lb. of chromium.	A practical and convenient form for adding ferro-chromium to the cupola.
High Carbon Grade	Chromium ..... 66/70% Carbon 4/6%	For wrought constructional steels and steel and iron castings.
Iron Foundry Grade	Chromium ..... 62/66% Carbon ..... 4/6% Silicon 6/9%	For alloyed cast irons. Ladle addition readily soluble at lower temperatures of cast iron.
Low Carbon Grades	Chromium ..... 67/72% Carbon .... .06%, .10%, .15%, .20%, .50%, 1.00% and 2.00% max.	For low carbon chromium steels, especially those with high chromium content, such as stainless steels and heat-resistant types.
Low Carbon Ferrochrome-Silicon	Chromium ..... 39/42% Silicon ..... 40/42% Carbon .... max. 0.05%	Used in stainless steels to reduce chromium oxide from slag and to add chromium to steel.
Experimental Ferrochrome-Silicon Alloy	Chromium ..... 48/52% Silicon ..... 25/30% Carbon ..... max. 1.50%	For simultaneous addition of chromium and silicon to low alloy steels and cast iron.
SILICON ALLOYS		
Ferro Silicon Briquettes	Two sizes, both cylindrical. The smaller contains 1 lb. of silicon; the larger, 2 lbs. of silicon.	A practical and convenient form for adding ferro-silicon to the cupola.
25/30% Grade	Silicon 25/30%	To deoxidize open hearth steels and add silicon to cast iron.
50% Grade	Silicon 47/52%	To deoxidize and add silicon to steels and cast irons.
75% Grade	Silicon 74/79%	For high content silicon steels.
80/85% Grade	Silicon 80/84.9%	For high silicon addition to steel; for slag treatment and graphitization of iron; for making magnesium.
85/90% Grade	Silicon 85/89.9%	
90/95% Grade	Silicon 90/95%	
Silicon Metal	Silicon ..... min. 96%	For making aluminum, other nonferrous alloys and silicones.

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
SPECIAL FOUNDRY ALLOYS		
Graphidox No. 4	Silicon ..... 48/52% Titanium ..... 9/11% Calcium 5/7%	Graphitizer for high strength cast irons; reduces chill; supplementary deoxidizer for cast steel.
Noduloy No. 12	Magnesium .. 10.5/13% Copper ..... 15/18% Silicon ..... 37/41% Iron ..... Bal.	Magnesium-containing alloys for addition to molten cast iron for manufacture of ductile (nodular) iron.
Noduloy No. 3	Magnesium 13.5/16.5% Silicon ..... 62/67% Iron ..... Bal.	
V-5 Foundry Alloy	Chromium ..... 38/42% Silicon ..... 17/19% Manganese 8/11%	To reduce chill and increase strength and hardness of cast iron.
TITANIUM ALLOYS		
Ferro Titanium High Carbon Grade	Titanium ..... 15/18% Carbon 6/8%	To control rimming action and deoxidize steel.
Medium Carbon Grade	Titanium ..... 17/21% Carbon 3/4.50%	To deoxidize and to add titanium to killed steels.
Low Carbon Grades 25% Titanium	Titanium ..... 20/25% Carbon .... max. 0.10% Silicon ..... max. 4.00% Aluminum .. max. 3.50%	Carbide stabilizer in high chromium corrosion-resistant steels of extremely low aluminum content. Deoxidizer for some steels.
25/32% Titanium Special	Titanium ..... 25/32% Carbon .... max. 0.10% Silicon ..... max. 4.00% Aluminum .. max. 2.00%	Alloy of high titanium-to-aluminum ratio for adding relatively large amounts of titanium to stainless and heat-resistant steels.
40% Titanium	Titanium ..... 38/43% Carbon .... max. 0.10% Silicon ..... max. 4.00% Aluminum .. max. 8.00%	Carbide stabilizer in high chromium corrosion-resistant steels.
VANADIUM ALLOYS		
Ferro Vanadium Iron Foundry Grade	Vanadium ..... 38/42% Silicon ..... 7/11% Carbon ..... about 1%	Imparts remarkable improvement in physical properties of iron with no sacrifice of machinability.
Grade A (Open Hearth)	Vanadium ..... 50/55% Silicon ..... max. 7.50% Carbon ..... max. 3.00%	For low vanadium steels and vanadium cast irons.
Grade B (Crucible)	Vanadium ..... 50/55% Silicon .... max. 3.50% Carbon ..... max. 0.50%	For tool steels and other high vanadium steels requiring a limited silicon addition.
Grade C (Primos)	Vanadium ..... 50/55% 70/80% Silicon ..... max. 1.25% Carbon ..... max. 0.20%	For making the highest vanadium and the lowest silicon addition to tool steels.
Vanadium Metal 90% Grade	Vanadium ..... 91.15% Aluminum ..... 2.25% Silicon ..... 0.50% Carbon 0.17%	For special iron-free (non-ferrous) or low iron alloys or low impurity ferrous alloys.
95% Grade	Vanadium ..... 95.18% Aluminum ..... 2.00% Silicon ..... 0.27% Carbon 0.40%	Principally for research on the properties of pure alloys. For use in applications where very low iron content is essential.
Vanadium Pentoxide, Tech. Fused Form	V_2O_5 ..... 88/92%	A source of vanadium in basic electric furnace steels. A base for numerous chemical compounds.
Air-Dried Form	V_2O_5 ..... 83/85%	Base for chemical compounds.
Ammonium Meta Vanadate, Tech.	NH_4VO_3 ..... min. 99%	For making sulphuric acid, synthetic organic compounds and vanadium chemicals.

Also special alloys, chemicals and metals of Aluminum, Chromium, Silicon, Titanium and Vanadium.

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • CHICAGO • DETROIT • CLEVELAND • PITTSBURGH

to eliminate sand conditioning problems like these . . .

A New York Foundry says of its Sandcutter: "We find the sand is far more properly mixed and the moisture is distributed evenly throughout the heaps. We find we are able to use finer sand due to thorough mixing and, of course, get a better finish."

poor sand conditioning

From an Ohio Foundry: "With our Sandcutter we found that we were able to reduce our costs greatly, obtain a more uniform sand which in turn aided us in increasing our production, reducing our foundry losses and producing a casting of better finish."

high cost

A Wisconsin Grey Iron Foundry reports: "We have found that we have cut our molding scrap losses better than 35% with our Sandcutter as compared with the hand method of cutting sand."

molding defects

From Chattanooga, Tennessee: "Before our Sandcutter was installed we were operating twenty-two floors, requiring the services of three shakeouts. At the present we are operating thirty-one floors with no increase in labor."

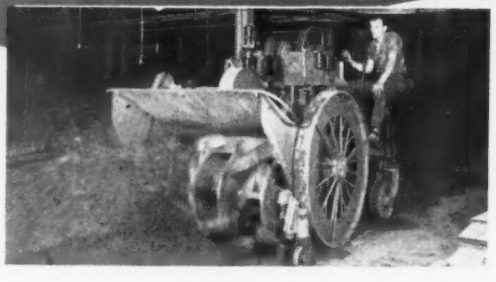
low productivity

In Jersey City: "Absenteeism was formerly a serious condition with the night crew, but now that the Sandcutter has disposed of the 'back breaking labor' of continuous shoveling, we have also disposed of our absentee problem."

absenteeism

Switch to SANDCUTTER®

There is a size Sandcutter available for every sand conditioning requirement. Write for complete information today.



SANDCUTTER® American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka, Indiana

(*Continued from page* 210)

vice president, William Kemp, Portland, Me.; treasurer, Harlan Penney, J. W. Penney & Sons Co., Mechanic Falls, Me.; and secretary, James Hamblin, Saco-Lowell Shops, Biddeford, Me.—*J. H. Orrok, Debevoise-Anderson Co.*

Michigan State

MICHIGAN State Student Chapter of the AFS was treated to a field trip through the Investment Casting Division of Midwest Foundry Co., Coldwater, Mich. on Nov. 6. The trip was of particular interest because the relatively uncommon lost-wax process was demonstrated in producing intricate and high-quality stainless steel and stellite castings. After the tour, the students were treated to a chicken dinner and the evening was completed with an extensive question and answer period. —*B. L. Harding*

Tri-State

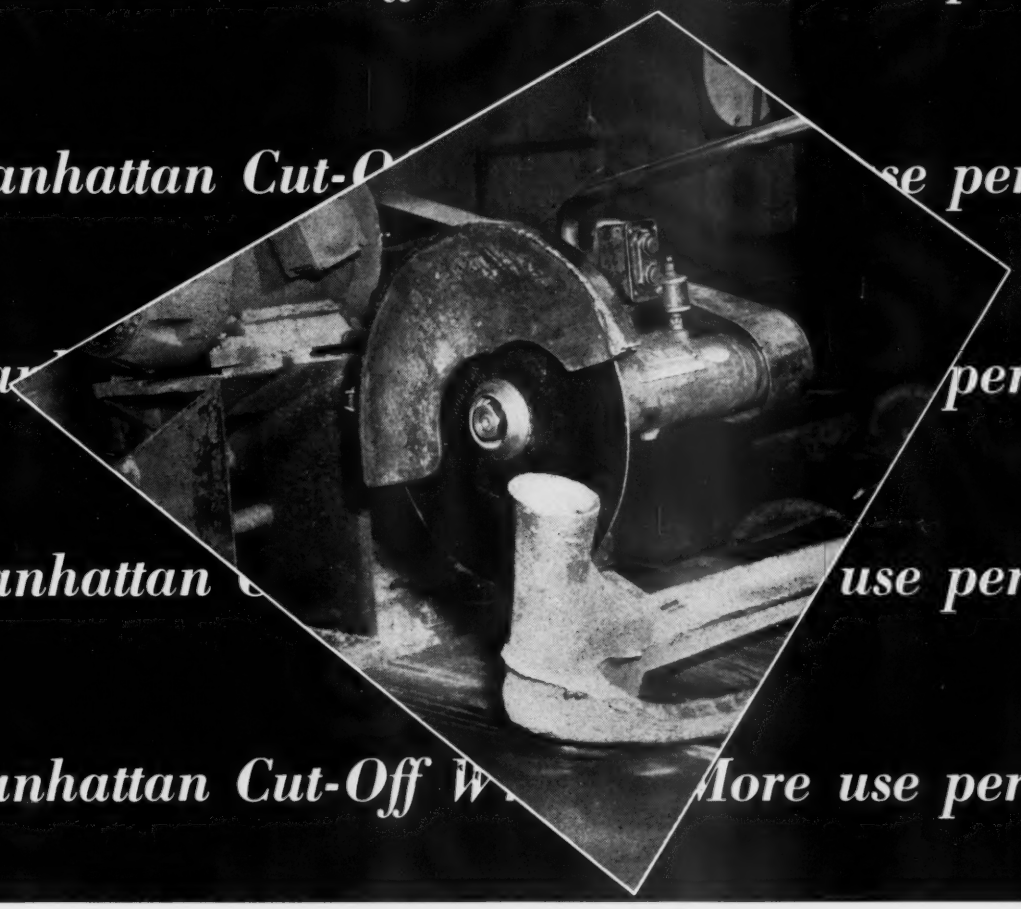
SECOND annual Christmas party and dance of Tri-State Chapter of the AFS was held Dec. 12 at the Blue Moon Club, Tulsa, Okla. A fine turkey dinner was served to 67 couples, after which a drawing was held and prizes of defense bonds, electrical appliances and flowers were distributed. The remainder of the evening was spent in dancing, bridge and canasta.

The committee in charge of ar-

(*Continued on page* 215)

TRI-STATE Chapter of the AFS held its second annual Christmas party and dance Dec. 12 in Tulsa, Okla.

Manhattan Cut-Off Wheels—More use per dollar



Manhattan Cut-Off Wheels—More use per dollar

REINFORCED FOR FOUNDRY CUT-OFF . . . Manhattan Reinforced Cut-Off Wheels are specially designed to perform under conditions of side-strain far beyond the limits of ordinary cut-off wheels . . . to perform safely and dependably under the toughest operating conditions. The result — more and faster work . . . with safety . . . at real savings to the foundry owner.

Try Manhattan Reinforced Foundry Cut-Off Wheels and note how their special lateral reinforcement gives you MORE USE PER DOLLAR. You will also find similar engineering features built into other Manhattan abrasive and diamond wheels.

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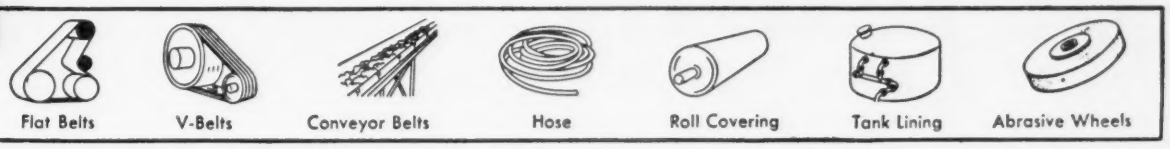
WRITE TO ABRASIVE WHEEL DEPARTMENT

R/M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



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Your sand and our clay work hand in hand.

As a core must fit its print, so must a clay fit the sand . . . Select the sand that gives you maximum results at minimum cost. Preserve both advantages, then, by choosing the right bond clay. No need to buy a special sand to fit a particular clay, because ECP produces and services four distinct types of clay and many combinations thereof. For standardized conditions we advise a standard clay like Dixie Bond, Black Hills Bentonite or Revivo. For specialized requirements we prescribe Balanced Revivo or Westonite. . . . So, select the one best sand for your purpose and convince yourself that an ECP recommendation can be, and always is, impartial — and effective.

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(*Continued from page* 212)

rangements for this successful party consisted of B. P. Glover, J. A. Dean, W. F. Harris and C. C. Beagle.—*F. E. Fogg, Acme Foundry & Machine Co.*

Twin City

IN spite of near blizzard weather on Nov. 25, 40 students and apprentices from the Twin City area attended a plant visitation sponsored by Twin City Chapter of the AFS. Host company was Minneapolis Electric Steel Castings Co., represented by R. C. Wood, vice president, and C. W. Sundberg, assistant metallurgist.

The trip was arranged by the chapter's educational committee under the direction of J. D. Johnson, Archer-Daniels-Midland Co., in conjunction with Mr. Wood and Mr. Sundberg. Here it was possible for the young men interested in foundry as a career to look into all the operations of a first-class jobbing foundry —from the pour-off to the final grinding, core and mold making and laboratory control. Their guides were well-versed in the general operation of the foundry as well as being specialists in certain departments. Coffee and doughnuts served at an informal get-together concluded the tour.—*R. J. Mulligan, Archer-Daniels-Midland Co.*

TWIN CITY Chapter of the AFS sponsored a plant visitation for 40 students and apprentices from the area Nov. 25. The group visited the Minneapolis Electric Steel Castings Co., Minneapolis. At left, those who attended watch the pouring operations. Photograph is by courtesy of Robert J. Mulligan, Archer-Daniels-Midland Co., Minneapolis

affected by air pollution ordinances so the society's interest extends into legislation to see that stipulations are within the realm of reason and do not overtax the industry.

To date there has been no economical equipment developed to take care of fines, the biggest problem. An electrostatic precipitator is the answer but it is too expensive for most foundries.—*William H. Faust, Electric Steel Castings Co.*

Chicago

FOUR roundtables featured the Jan. 5 meeting of Chicago Chapter of the AFS, at the Chicago Bar Association. This, the second of a series of four such meetings arranged for the 1952-53 season, attracted over 210 members and guests.

Chapter President John H. Owen, Chicago district sales manager, Harbison-Walker Refractories Co., conducted the meeting. Roy W. Schroeder, assistant professor of foundry and pattern laboratory, Navy Pier Branch, University of Illinois, and chairman of the chapter's Educational Committee, detailed further progress in organization of the School of Gating and Risering to be held in March. Deming H. Lucas, Chicago sales representative, Pittsburgh Metals Purifying Co., reported as chairman of the Membership Committee.

(*Concluded on page* 217)

Central Indiana

BACKING up the society's current safety, hygiene and air pollution campaign, Central Indiana Chapter of the AFS devoted its December meeting to a consideration of how to make the foundry a better place to work.

Featured speaker was William N. Davis, director of safety, hygiene and air pollution, AFS, Chicago, with J. P. Lentz, International Harvester Co., Indianapolis, serving as technical chairman. Mr. Davis stated that the frequency rate for the foundry industry is 26.9 accidents per million manhours worked, compared with 13.5 for all industry and 4.6 for the basic steel industry. The safety committee is producing a film which will soon be available, and organized training courses are being readied. Seminars are planned for the University of Wisconsin and the University of Illinois. An air pollution manual also is being developed for the foundry industry.

The air pollution problem is complicated in that once dust has been collected inside it must be treated in such manner that it will not pollute the air outside. An ever increasing number of foundries are being

CENTRAL INDIANA Chapter of the AFS met Dec. 1 to hear William N. Davis, director of safety, hygiene and air pollution, AFS. Left to right are Technical Chairman J. P. Lentz, International Harvester Co., Indianapolis; Chapter Chairman Carl O. Schopp, Link Belt Co., Indianapolis, and Mr. Davis. Photo by courtesy of Henry Yeager, International Harvester Co., Indianapolis

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your heavy loads
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"THRU-THE-AIR"
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How much does materials handling add to your production costs? Along assembly lines? Around machine tools? On loading platforms? In and out of storage? Handling materials is the largest single cost item in most plants. Start licking it now!
Thousands of plants have found the answer to efficient movement of materials with this quick, effortless, low cost way — "thru-the-air" with P&H Hevi-Lift Hoists.
You merely press buttons to whisk loads from one station to another — no strain on skilled hands, no floor congestion, no costly delays. With P&H's full magnetic push-button control, you can also have variable speed where needed.
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ELECTRIC HOISTS
SOIL STABILIZERS
WELDING EQUIPMENT
OVERHEAD CRANES

(*Concluded from page 215*)

Nonferrous division roundtable devoted its attention to "Control of Molding Sand and Cores." LeRoy E. Taylor, service engineer, Goebig Mineral Supply Co., was the speaker, and Robert F. Dalton, development engineer, United States Gypsum Co., presided.

Gray Iron and Pattern divisions joined in sponsoring a roundtable on "Gates and Risers." A. C. den Breejen, foundry superintendent, Nichol-Straight Foundry Co., was chairman, and the panel of experts consisted of Bert Eleder and Edward Gricus, general foreman and foundry foreman, respectively, Link-Belt Co., and Theodore Wrobel, foundry general foreman, McCarthy Foundry Co., constituted the panel of experts.

"Cores" was the subject considered by the Malleable division roundtable. Robert P. Schauss, Chicago sales manager, Werner G. Smith Inc., was speaker, and Cecil F. Semrau, metallurgist, Illinois Malleable Iron Co., was chairman.

Steel division roundtable was devoted to discussion of "Sand Problems," with A. L. Kreuer, sales manager, Orefraction Inc., Pittsburgh, as guest speaker. H. D. Hunt, foundry engineer, Pettibone Mulliken Corp., was chairman, and A. P. DiGirolamo, foundry foreman, Chicago Steel Foundry Co., and R. C. Nelsen, district manager, Sterling Wheelbarrow Co., assisted as discussion leaders.

Next meeting of the chapter on Feb. 2 also will feature roundtables. Gray Iron and Pattern divisions will convene jointly; Malleable will discuss "Air Furnace Brick Bottoms;" Nonferrous will consider "Precision Molding Methods;" and Steel division will concentrate attention on "Sand." —*Erle F. Ross*

Western Metal Congress Offers Foundry Program

Authoritative speakers will discuss casting of iron, steel and nonferrous materials at the technical programs to be presented by Los Angeles Chapter of the American Foundrymen's Society at the Western Metal Congress, Mar. 23-27, Hotel Statler, Los Angeles. W. W. Stevens Jr., Stanley Foundries, Huntington Park, Calif., who has been named program chairman by Chapter Chairman Harold Pagenkop, Angelus Pattern Co., Los Angeles, states that an effort will be made to direct the foundrymen's sessions to both technical and management groups in the industry.

Other societies which will hold technical sessions during the congress include American Society for Metals, American Welding Society, Society for Nondestructive Testing, and American Institute of Mining and Metallurgical Engineers, Metals Branch.

On the same dates as the congress, the Western Metal Exposition, with numerous exhibits concerning foundry work, will be held in Los Angeles' Pan-Pacific Auditorium. Both congress and exposition will be presented by ASM and the western sections of 19 co-operating technical societies, including AFS.

Metropolitan

RECORD attendance of 500 members and guests were present Dec. 19 at the main ballroom of the Essex House, Newark, N. J., to enjoy the annual Christmas party of Metropolitan Chapter of the AFS.

The dinner and party arrangements were under the direction of Entertainment Chairman Howard E. Voit, Sterling Wheelbarrow Co.—*W. T. Bourke, American Brake Shoe Co.*

MICHIGAN STATE COLLEGE STUDENT Chapter of the AFS took a field trip through the investment casting division of Midwest Foundry Co., Coldwater, Mich., on Nov. 6. On the left, students are observing a shell molding machine in operation. In the right view, R. S. Banister, manager, precision division, is explaining the operation of a large wax injection machine

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Structural strength? You can take that for granted. But look closely to the electrical equipment. That's the important factor in overhead crane service. That's why P&H builds its own electrical equipment — designed exclusively for crane operation, not adapted for it. Experience is the reason for P&H leadership — experience in building and servicing more than 18,000 electric cranes — far more than any other. You make no mistake when you let P&H build the entire crane — and take the complete responsibility for service.
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Write for Bulletin C-6
P&H MAGNETORQUE® AC Crane Control provides the finest known speed-load characteristics.
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Adventures of BILL

By PAT DWYER

Illustrations by RICHEY

THE United States mail is a wonderful institution. I sincerely trust the printer in his omnipotent wisdom does not set that up as *male*, for while the description in a general way applies to the latter I have no intention at the moment of discussing either his attributes or peculiarities. What I have in mind is the postal system and the ready facilities it affords for establishing communication between people who are minded occasionally to take the pen in hand.

The point I wish to make is illustrated neatly in a little anecdote current during a recent historical period before it had been decided definitely who had won the war. Now that each of the nations involved modestly has appropriated the honor, the question has been lifted out of the controversial class and probably will arouse no further interest until the members of the Hokendaukqua high school debating team of 1975 are casting about for a suitable subject on which to whet their oratorical blades.

During the period of stress and strain, while the papers manfully were keeping abreast of the times, and the more enterprising keeping perhaps even a lap or two ahead of the times through their forecasting department, two colored gentlemen one day engaged in a discussion touching on the range and carrying power of the big guns developed by each of the warring nations. One gentleman, having absorbed as much of the information and misinformation as he could assimilate, was frankly pessimistic.

"Boy," he declared earnestly, "len' me yo' big floppin' eahs fo' a minit. Dis heah am goin' to be a long-distance wah. Dem Gemmans is done got a gun as long as fum heah to hellangone dat'll shoot a man whuts outa sight 75 miles away."

"Huh," remarked the second expert, pityingly. "Whuts 75 miles Ah'd lak to know? De United States navy is done got a gun, too, an' believe me when dat gun pops it ain't all quiet along de Potomac tonight. W'en de Cap'n wants to shoot a man, all he wants is de man's neahest post office add'ess. Das all. Jes' his neahest post office add'ess, or even his telephone numbah!"

Having enlisted the wholehearted co-operation of the postmaster general by affixing a well executed steel engraving bearing a representation of the features and wig of the sage of Monticello, printed in blue, to the upper right hand corner of an envelope, a perfect stranger recently forwarded a letter to my address. I take this opportunity of paying a tribute to the well known carrying power of the United States mail by stating that the missive was delivered safely into my hands a few days afterward. It was mailed in a town about 100 miles from here and I can account for the slow passage only on the theory it was addressed to FOUNDRY and therefore probably classed as nonperishable freight.

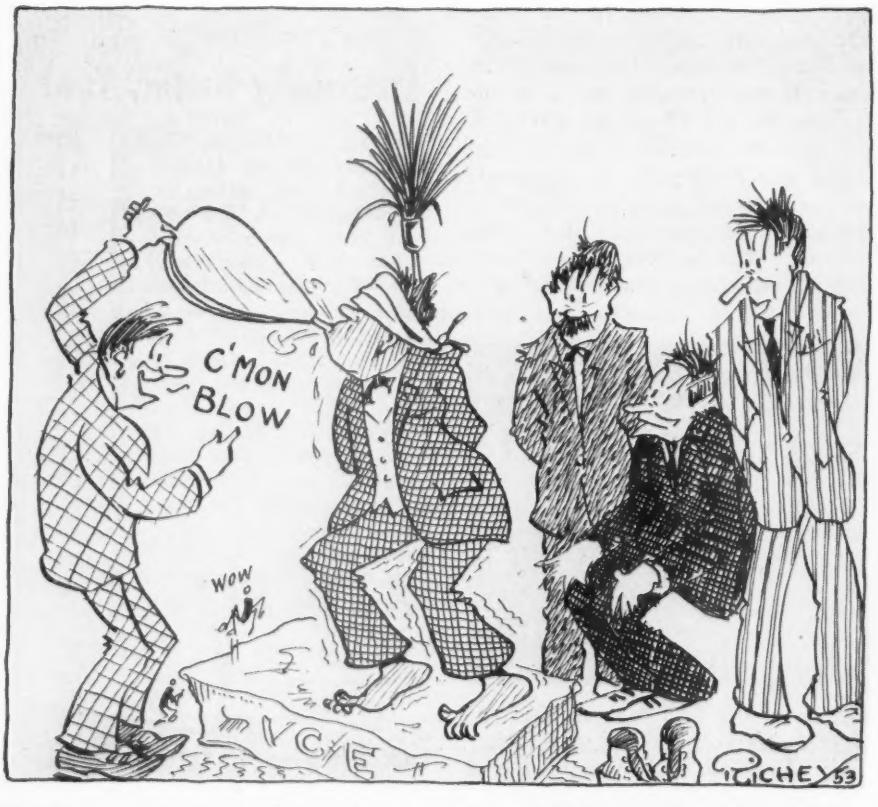
The letter was written in pencil and bore abundant evidence that the pencil point frequently had been lubricated during the composition. With the exception of the formal beginning and ending it was written in a truly informal style with easy disregard for punctuation and spelling and an evident partiality for capital letters. I had to read it over twice and then sprinkle a few periods, colons and semicolons through it here and there before I could properly appreciate the message.

Deer Sir & Bro: I seen in one of your peaces lately where your old friend Bill made a Loom pot in a certain Shop in the east and from the Way it was wrote I suspect that me and Bill worked thare at the same time. I worked in the dog House and it ain't Likely he remembers me but I mind all the Gang what worked on the Dry dock when them Pots was going through and I guess he is the same Bird what used to leave his Paper of polar Bare on the edge of the flast and then offer to crack any Gink on the head who tried to Touch it.

Ast him if he remembers the day he blamed the ginney for stealing his Shovel and chased him with a Rammer all over the shop until the Poor guy jumped into one of the roll Pits and blame near broke his neck. Ast him if he remembers the Oil works where he Used to be asst bar tender on Rush nights and Pay nights because on account of he was on the Keg himself in them there times. He certinly wuz one Gabby guy and had more to say at a Meeting than any other Three members. I think he must of learned the Constitution and manual off by Heart and he always Spoke of the national Officers by their first name.

I guess I won't never forget the night he acted as Inducter and helped to Inishiate 3 candidates wit frills and trimmins that ain't in no Ritchual. He made them leave thare shoes and soks in the antyroom and then Led them in blindfolded and ast them in Turn to step on to the skales while he chekked there wait. The skale was a block of Ice and them Birds thot thay wuz standing on a red hot Plate. To try there grip he got 'em to hold the Handle of one of them

(*Continued on page* 221)



Initiation ceremonies unchanged since the days when knighthood was in flower

Why U. S. Rubber grinding wheels are the choice of steel foundrymen!

Small photo at top shows worker grinding large "T" used in refineries. Large photo shows worker smoothing casting of elbow.

A foundry in Georgia, casting steel pipe fittings, removes gates and flash, grinds openings and bolt holes—using U.S. Royalite® Grinding Wheels exclusively. Why? Because they have proven to be the most efficient and economical. They are fast-cutting and remain cool in operation.

Over 89 years of experience with bonds and abrasives enable United States Rubber Company to lick most any grinding wheel problem you may have. Write to address below.

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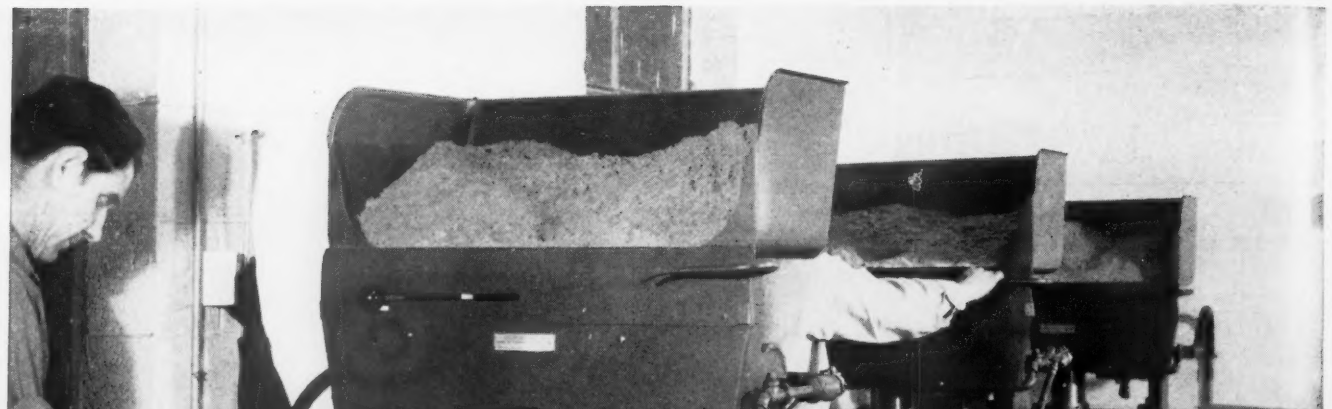
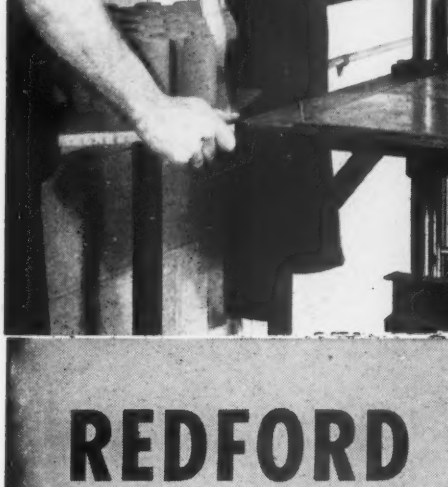


REDFORD *No. 2 Stationary Magazine Type* CORE BLOWER



NEW features and functional design permit maximum production with a minimum of effort . . . Accepted in hundreds of foundries as the most efficient machine for the production of cores up to 5 lbs.

Write for Specification Bulletin "F".

Redford Cartridge Type Bench Core Blower

- **The original small core blower.**
- **Proven simplicity—Speed and Flexibility.**
- **Makes cores up to 2 lbs.**
- **Thousands in use.**
- **Write for Bulletin "G".**

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Phone KEnwood 1-8611

(*Continued from page* 218)

little Hicky battries and then shot a Jolt into 'em that nearly loosened their back Teeth. He told them it would now be nessary to Test their lung capacity to see if they were a good insurance risk and qualified for sick and death Benefit. He held the nose of a bellas in their mouth and told them to Blow as hard as they could. They bloo until they nearly bust thare gawl and when Bill was satisfied thare wasn't a gasp left in 'em and they was in danger of blown a fuze, he announced thare lungs was under developed and advised em to take an hours exercise with the Dum bells before going to work every morning and another hour at night after porin of the Heat.

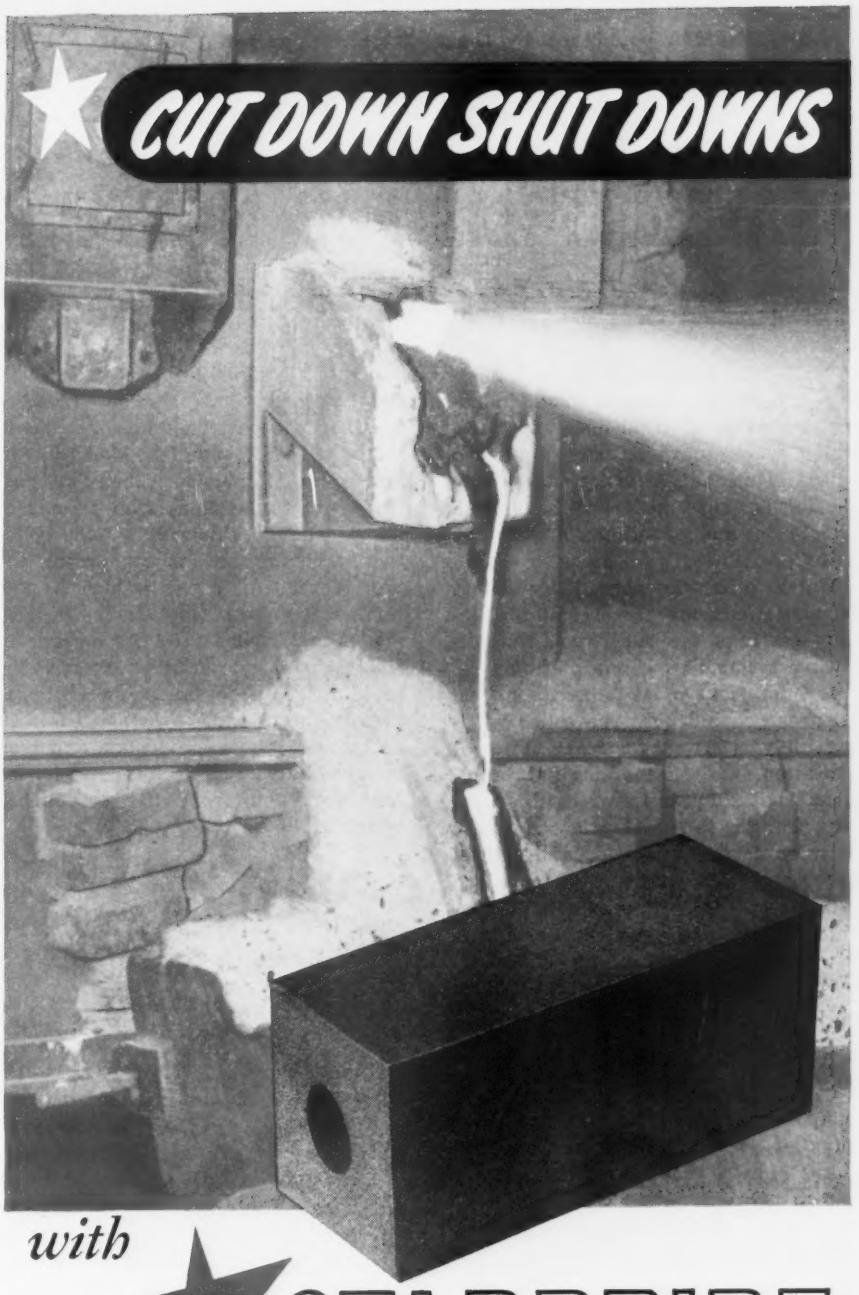
He stuck the Handle of a long feather Duster down the back of each mans coat coller with the fethers kind of droopin over his head like a Weepin Willa tree and got em to do the Goose step single file Each man holdin on to the coat tail of the man ahead and the first man holdin on to the end of a Wet swab whill Bill held the Other end. He led them all around the Hall and when they got back in Front of the Chare he faced them around to where the rest of the Members were sittin in Convulshens. He joined thare hands and ordered them to say heehaw 3 times as loud as they could.

I'll say them was the Good old days. Next time you see Bill ast him if he ever run acrost Red Micknevin in the course of his Travels since he left down there. Red was a good old Scout but I ain't never run acrost him for a good many years. I wonder if Bill knows where he is at now. Hopin this finds you Well as it Leaves me at present. I remain yours faternaly. Tim (Peg) Donovan

P.S. I don't care much for this Dump and may blow any minit so if you write I wish you would write quick. The flasts is Punk and the Sand ain't got no Body to it and the gaffer is a regular old Crab if one drops out on you. I has a little Trouble today and he starts to ball me Out but I told him where to get off at. I sez I worked in shops where they woodent allow the like of you to claywash the Gaggers and to can that Home gard stuff and give me my Time. He didn't have no comeback and went away Growlin. I see where Me and him ain't going to do no kissin and makin up. Hows things in Cleveland?

I have no intention of posing as an efficiency expert, one of the super busy boys who always keep the snappy reminder *Do It Now* framed over the desk. Due to advancing age and other limitations, I cannot qualify as a member of the Boy Scouts with their bright and shining motto; One Kind Action Every Day. In fact a strict regard for the beautiful virtue of truth compels me to admit that the best I can hope for is to be classed as one who derives a certain amount of satisfaction from the proverb Better Late Than Never!

However, on this occasion I felt a little direct action was necessary. That same evening I rambled over to Bill's place and placed the letter in



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Longer Cupola Runs because Starrbide Carbon-bonded slag hole blocks stay in use longer than ordinary blocks.

Reduced Erosion
from heat and slag flow to an amazing minimum.

Improved Flow Control
because runs are longer, more easily scheduled.

Higher Thermal Conductivity
rapidly dissipates heat.

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because shutdowns are reduced.

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ALSO MAKERS OF FAMOUS STARRBIDE CARBON-BONDED CRUCIBLES, GRAPHITE CRUCIBLES AND SUPER REFRACTORIES.

his hands without comment. He read it through and I could see by the manner in which he grinned at some of the allusions that my unknown correspondent had scored what I have been led to believe is known in sporting circles as a bull's eye.

"Remember him?" he said. "I should say I do. He was the only molder with a wooden leg I ever saw working at the trade. He was on the road 10 or 15 years before my time and had worked in every town of importance between the two oceans. In-

(*Continued on page* 224)

SALES TERMS FOR NONFERROUS CASTINGS

Are Developed by Founders' Society

THE Non-Ferrous Founders' Society has developed a set of industry terms and conditions of sale, which were approved and published by the National Association of Purchasing Agents in December, 1952. The terms and conditions of sale are as follows:

Unless otherwise agreed in writing, all quotations are made and nonferrous castings are sold upon the following terms and conditions:

1. Quotations must be accepted and releases scheduled to the seller within thirty (30) days from date of quotation, with the additional provisions that quotations are subject to any changes in metal price structure between date of quotation and date of acceptance.

2. All castings are sold as unmachined castings, with heads, gates, fins and similar extraneous metal removed to approximately the contour of the casting, FOB transportation agency. Terms—thirty (30) days net from invoice date.

3. Claims for error in weight or number must be made within ten (10) days after the receipt of castings.

4. Credit will be given for castings rejected due to foundry defects. Such castings must be reported and returned to the seller within ninety (90) days after their receipt. Credit will be given and transportation allowed for actual weight of such castings returned. Seller is not responsible for machine work, welding, inserts or chills furnished by purchaser, labor charges or any other losses or damage caused by defective castings.

5. Seller is not responsible for loss of or damage to pattern equipment by fire or other casualties beyond its control. It is the responsibility of the purchaser to carry all forms of insurance that he deems necessary.

6. The seller shall not be liable in damages for failure to deliver, and the purchaser shall not be liable in damages for failure to receive, as a result of fires, strikes, differences with employees, accidents or other causes beyond their control.

7. Inquiries from purchasers shall give actual or estimated rough weight of castings and an accurate detailed description of pattern and corebox and other equipment to be furnished. This description should indicate whether the pattern and corebox are plated, gated, single, skeleton or sweep, metal or wood. When new patterns are to be made, the purchaser should submit blueprints to the seller to obtain suggestions concerning the best method for constructing the pattern equipment. Quotations will be made on purchaser's information.

8. When quotations involve the making of piece prices, weights as nearly definite as possible shall be established and agreed upon and quotations shall be subject to revision on any variation from the established weights.

This is the new emblem adopted by the Non-Ferrous Founders' Society in connection with the observance this year of its tenth anniversary

9. Should purchaser require special treatment of castings such as heat, special analysis, chemical and physical specifications, test bars, pressure tests, x-ray, etc., his inquiry shall set forth such requirements in detail. All special treatment in excess of processes described in condition No. 2 shall be at purchaser's expense.

10. No order shall be changed without liability unless notice of revision is made and accepted in writing before work is in process. When a change is necessary and the work is in process, purchaser is to be charged for any castings previously made as well as cost of cores, molds or equipment discarded because of such changes.

11. Cancellations of orders without liability are to be made only by mutual consent of purchaser and seller. Cancellations and/or deferred deliveries must provide for fair payment for work in process.

12. The seller is to make an effort at all times as operating conditions will permit, to furnish as near as possible, the exact quantity specified. However, unless otherwise stipulated, the purchaser shall accept an overrun of not to exceed 10 per cent above quantity specified on order.

13. Special production service to secure unusual deliveries not in accordance with original delivery instructions, shall be given on written request and at purchaser's expense.

14. Purchaser shall supply pattern and corebox equipment in proper condition to produce the quantity and quality of castings agreed upon. All repairs and changes necessary to place equipment in proper condition shall be the purchaser's obligation.

15. The foundry shall not be liable in any manner for loss or damage by reason of the manufacture and sale to the customer of any patented device or parts thereof made in accordance with drawings, designs, models or patterns furnished by the customer.

16. Seller is not responsible for variations existing between blueprints and pattern and corebox equipment supplied by purchaser. If requested by purchaser, seller will check patterns and corebox equipment with blueprints at purchaser's expense unless otherwise agreed to by the seller.

17. All patterns, coreboxes and loose pieces thereof, shall be marked properly for identification.

18. Follow boards, core driers and similar devices when required are to be furnished by purchaser.

19. All freight, drayage, boxing and crating charges on patterns, both to and from the seller, shall be assumed by purchaser.

Completely New and
Proven Operating Principle

Custom Built in
any Length, Width or Depth

ADAMS CHERRY EASY-OFF FLASK

These advantages will cut your production costs!

SIDES AND ENDS finished 1⅛" on all standard size flasks. 1¼" and heavier on flasks of larger perimeters and depths. Cherry lumber is finest available; air dried.

SOLID CORNERS are machine locked to maintain alignment and to insure maximum rigidity.

MALLEABLE TRIMMINGS are another famous Adams feature; assure long life and exceptional service.

OPERATING MECHANISMS are completely new in design, yet of proven construction. Exceptionally simple, offering single-point adjustment; ease of operation on tough jobs.

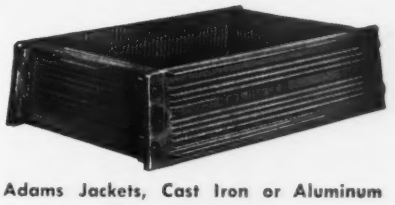
ADJUSTMENTS made *only* when mechanism is in *locked* position.

SPECIALLY DESIGNED INSERTS located in main body castings permit reversal of locking position. As "standard" flasks are furnished with handles locking in "up" position. To change, remove main bolt handles and inserts, reverse inserts and handles and reassemble.

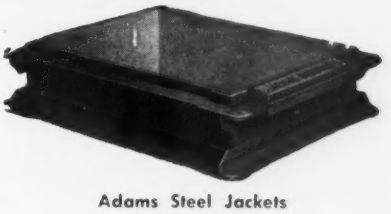
ALUMINUM PROTECTING STRIPS are standard equipment at top of cope, bottom of drag and at parting. Steel strips available upon request at no extra charge.

WIDE "V" PINS & EARS standard on all flasks. Other types available.

Adams Aluminum Easy-Off Flask



Adams Jackets, Cast Iron or Aluminum



Adams Steel Jackets

Write today for full details . . .

Cherry Snap Flasks—Cherry Slip Flasks—Aluminum Slip Flasks—Easy-Off Flasks
Cherry Presser Boards—Wood Bottom Boards—Steel Bottom Plates—Steel Jackets
Aluminum or Cast Iron Jackets—Steel Bands—Steel Upsets—Cherry or Aluminum Upsets

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

PAYS OFF FOR FERRO MACHINE HERE

Ferro Machine & Foundry Inc., Cleveland, Ohio, one of the largest independent gray iron foundries in the U.S., has been in business over 40 years. Their specialty is automotive type castings. To keep production up, Ferro puts 38 tons of high strength alloy iron through a "Q" Lectromelt in 16 hours. At 2900° this pace has been death on furnace roofs. Using special shape silica roofs, Ferro was getting a service life of 4 weeks per roof. After switching to Shamva 65G ramming cement, Ferro now reports an increase of roof life to 7 weeks.

Shamva cements, as well as Shamva brick and shapes, can do a job for you, too. Why not see what Shamva can do for your production curve. Our field engineers will be glad to discuss it with you.

THE MULLITE REFRACTORIES CO.

SHELTON, CONN.

In Canada, Shamva Products Co., Ltd., Niagara Falls, Ontario.

(*Continued from page 222*)

stead of being a liability his wooden leg actually was an asset and secured him many a ride in the caboose when his less fortunate two-legged friends were forced to do their migrating on the bumpers and brake beams. I don't know how he lost his leg. I have heard about 40 different versions of the story, ranging all the way from the one where he stepped into an open sand mold just poured, to the one where he claimed it was bitten off by an alligator in a Florida swamp.

"The loss did not seem to bother him to any extent. He could put up as good a day's work as the next man. When it came to pouring off he could take his place between the handle of a 250-lb bull ladle and navigate his way down the gangway as readily as any man, and better than some men equipped with a full set of legs and feet.

"He had one pet aversion. He would not work on a molding machine. Of course, his attitude at that time when molding machines were something of a curiosity was more in line with the spirit of the times than it is now when the foundry not equipped with these labor savers is almost as much of a curiosity as the foundry with them was at that time.

"Considering the subject in its broader aspect it may be said that men constitutionally are opposed to changes and innovations. They do not take kindly to proposed changes in established practice. Because a certain thing always has been done in a certain way seems to constitute a sufficient reason for continuing the practice indefinitely. Any person who departs from the beaten path is regarded either with open hostility or with a measure of kindly toleration depending on whether his actions tend to interfere with the pet projects of other people.

"The foundry business, especially in recent years, has had its share of pioneers who blazed new trails into hitherto unexplored territory. Also it has had its share of doubting Thomases who not only decried the proposals advanced by the pioneers, but also refused to accept the conclusions. They persisted in carrying on their business along obsolete lines.

"From its very nature the molder's trade always has been shrouded more or less in mystery. So many variables enter into the preparation of a mold that at times it is impossible to say which of them or which combination may be responsible for a defective casting. In nearly all other branches of the mechanical arts, the craftsman can watch the progress of his work, supply any deficiencies, test it

(*Concluded on page 226*)

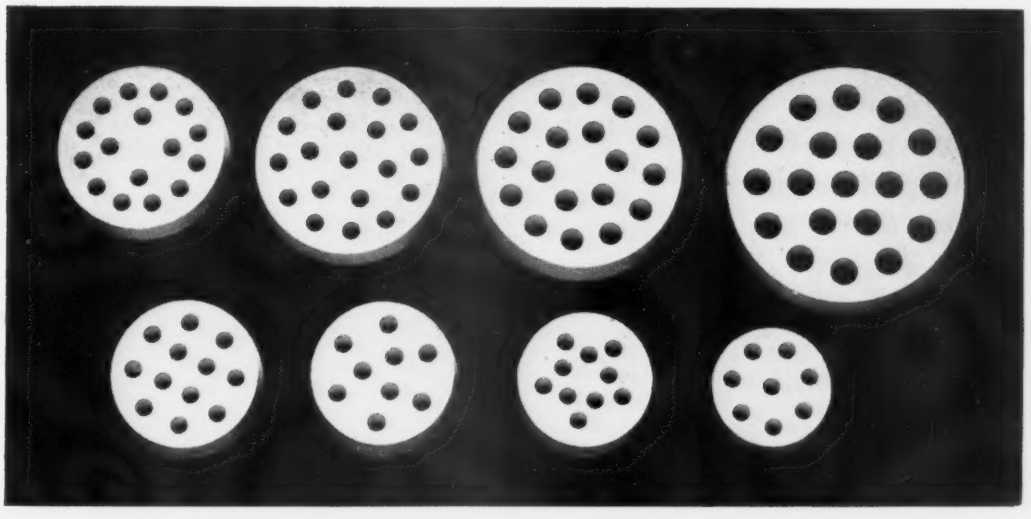
To the Scrap Pile Again...

What did it cost YOU?

There's no profit in "spare time" sand strainer core making when it builds a bigger scrap pile. And all too often rejected castings charge up costly machining time before they're discarded. Pour them perfect with Porcelain Products Ceramic Strainer Cores. Bonded with interlocking refractory crystals, they withstand high heat, thermal shock, have unlimited storage time and aren't affected by atmospheres. Write for details on how Porcelain Products Ceramic Strainer Cores can give you cleaner castings and less scrap.

WON'T

- **SPALL...**
- **ERODE...**
- **DISINTEGRATE DURING POURING**



PP INC.

Porcelain Products, Inc.

FINDLAY, OHIO

"Where canvas gloves lasted 3 to 4 days, Edmonts wear 3 to 4 weeks"

— *Homer Foundry Corp.*

Many well managed plants, like Homer Foundry Corporation at Coldwater, Michigan, have greatly reduced the cost of supplying gloves to workmen by standardizing on modern fabric gloves with tough natural rubber or NEOX coated palms. Workmen find these cloth-backed gloves more comfortable than "dipped" gloves and more suitable for hot castings than plastic gloves which tend to melt with heat.

Long-wearing natural rubber coated glove used at Homer Foundry . . . .

NEOX (Reinforced Neoprene) Coated Gloves Best Resist Combined Cutting and Abrasive Wear, Oils, Chemicals and Heat . . . .

For core-making and the grinding, polishing and handling of castings, NEOX coated gloves far outwear leather, canvas or ordinary neoprene, are unusually flexible and comfortable. For molding, core removal, sand blasting and general yard work, natural rubber and new type plastic coatings are also widely used.

Job-Fitted Gloves Pay Dividends to Management in fewer lost-time accidents, faster work handling, less spoilage, better employee attitude and 40% to 70% average savings in glove costs. As world's largest maker of coated industrial gloves we will recommend the type that best fits your application.

Free Test Offer: Send brief description (on business letterhead) of your operations, materials handled and temperature condition. Without cost we will supply samples of the correct gloves for testing on-the-job.

Edmont Edmont Manufacturing Company
1274 Walnut Street, Coshocton, Ohio
job-fitted gloves

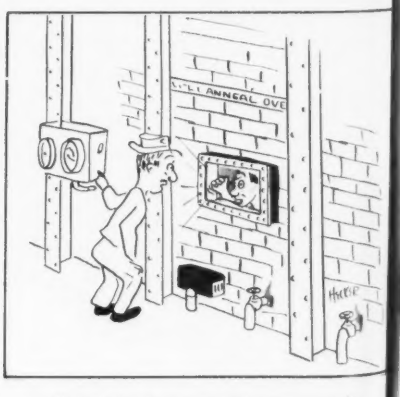
(*Concluded from page* 224)

at various stages, and assure himself in various ways that when the job is completed, it will be satisfactory and will fulfill the purpose for which it was designed and intended.

"The molder has none of these guide posts to help him on his way. All he can do is follow established precedent. The only test he can apply is the final test of pouring the metal into the completed mold. If the mold stands up to the test, well and good. If not, he cannot suspend operations while he looks for the factor responsible for the trouble. Some symptoms of the causes of many defective castings are familiar to all foundrymen. They are in position to apply preventive measures intelligently. Many causes are more obscure. Considerable experimenting is necessary before a remedy can be prepared and applied. In the course of his experiments the foundryman may try many changes. Finally when he succeeds in turning out a perfect casting, he may be at a loss to determine which of many changes has been responsible for the solution of the problem. Consequently, he retains them all, having little incentive to experiment further."

"All quite interesting Bill," I said, "but that is not what I came over here for. Will you write to Tim or shall I tell him that I have seen you and that you send him your love and so forth and etcetera. Also, what about Red McNevin. Do you know where he is?"

"You write. I hate that kind of work. Tell him whatever you like or whatever easily comes to mind. Chances are you'll forget to put the stamp on the letter and the red fella never will get it. Small loss, if you ask me. The last I heard of Red about four or five years ago he was on his way to Peru. In the natural course of events one of these days I shall not be at all surprised to see him creeping from between the trucks of an overland freight out here in the Collinwood Yards."

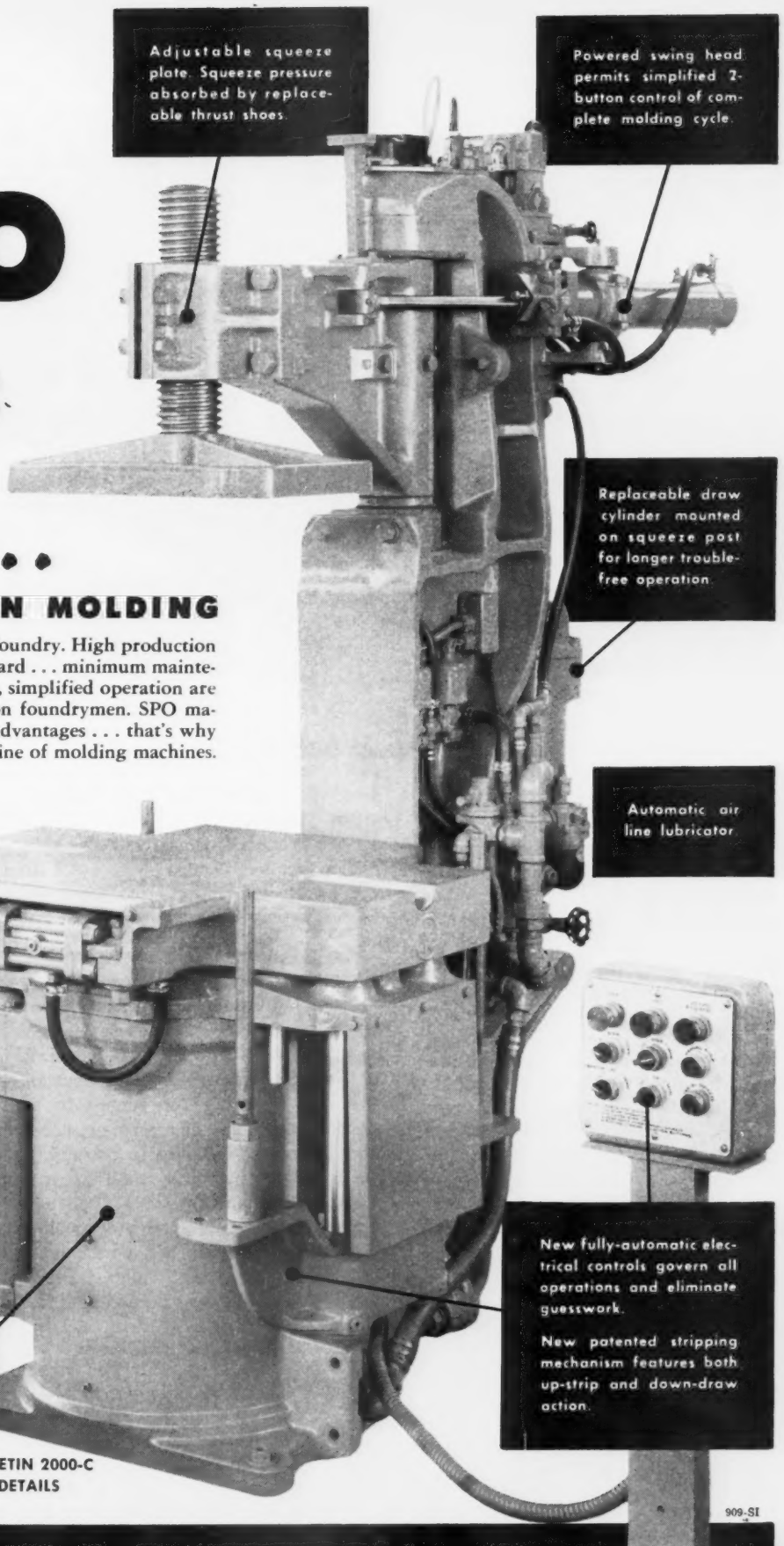


"Won't be long now, Ed; the anneal's almost over."

SPO Builds the Best...

FOR PRODUCTION MOLDING

It's *performance* that counts in the foundry. High production capacity . . . molds of uniform standard . . . minimum maintenance and replacement . . . and safe, simplified operation are recognized as "musts" by production foundrymen. SPO machines offer these and many more advantages . . . that's why they are the world's most popular line of molding machines.



Adjustable squeeze plate. Squeeze pressure absorbed by replaceable thrust shoes.

Powered swing head permits simplified 2-button control of complete molding cycle.

Replaceable draw cylinder mounted on squeeze post for longer trouble-free operation.

Automatic air line lubricator

This Model 2160-C JOLT-SQUEEZE-STRIP/DRAW features a 1500 lb. jolt . . . 16,000 lb. squeeze . . . adjustable pattern draw (6 to 10").

Adjustable stripping pins accommodate wide range of flask sizes.

Patented SPO "inverted jolt" reduces maintenance and replacement costs to minimum.

New fully-automatic electrical controls govern all operations and eliminate guesswork.

New patented stripping mechanism features both up-strip and down-draw action.

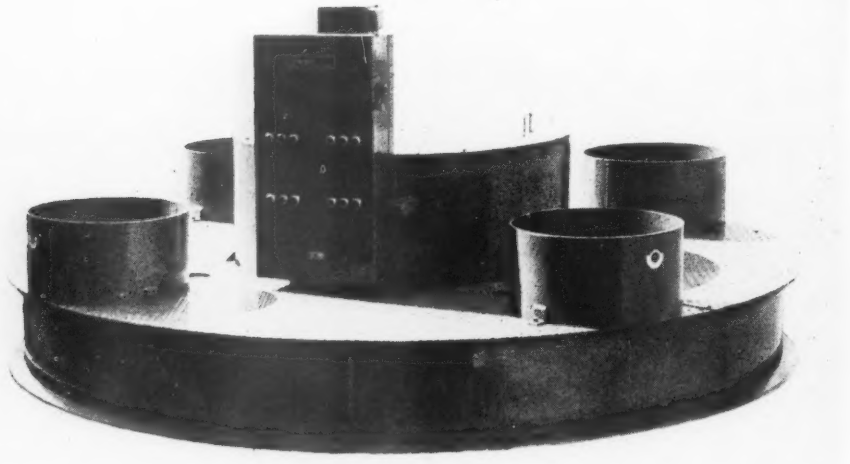
WRITE FOR BULLETIN 2000-C FOR COMPLETE DETAILS

909-SI

SPO INCORPORATED

6449 GRAND DIVISION AVE. • CLEVELAND 25, OHIO

New EQUIPMENT and



Centrifugal Casting: Centrifugal Casting Machine Co., Orpheum Bldg., Tulsa, Okla.—Vertical, four spindle, turntable type semiautomatic centrifugal casting machine automatically indexes 90 degrees and stops. When a spindle approaches the pouring station, it automatically comes up to spinning speed, metal is poured and a button is operated to initiate the indexing. Poured mold continues to spin until the metal has solidified. Approaching the casting removal station, the mold brakes to a stop. The same spindle continues to the next station, where it is loaded with a mold and is again ready for pouring. Turntable is 10 ft in diam. and has variable rotative speed of from 1 to 3 rpm. Each spindle is driven by a 5-hp, variable rotative speed motor with brake. Pushing a button initiates the start of each movement. Machine can be used to make ferrous or nonferrous centrifugal castings in either sand or permanent molds.

For more Details Circle No. 1—Page 231

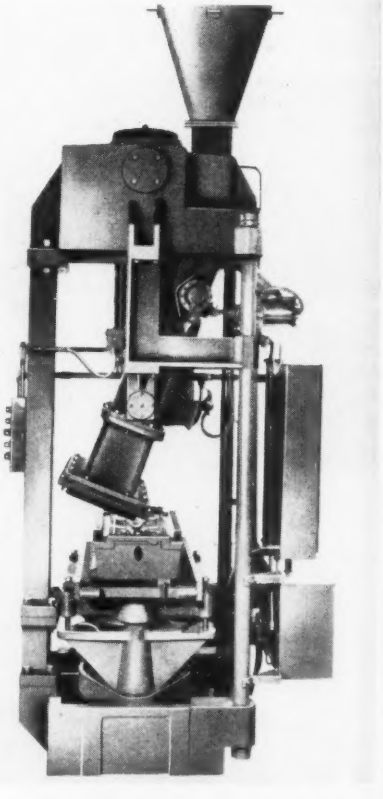
Mortar Mixers: Muller Machinery Co., Metuchen, N. J.—Three new models of plaster and mortar mixers incorporate a paddle shaft seal which the manufacturer states will give positive bearing protection. A 3½ ft model, now the company's smallest, is available with a 1-hp electric motor or with 2.7 or 3.1 hp engine. The 6-ft model of the line is available with a 3-hp electric motor, 220/440 v, or with 4.6 or 7.7 hp engine. A 6 to 8 ft heavy-duty model, for large jobs or exceptionally severe service, comes ordinarily with a 7-hp engine, but is also available with a 5 hp electric motor, 220/440 v.

For More Details Circle No. 2—Page 231

Cold Solder: A. L. Okun Co., 148-26 58th Ave., Flushing 55, New York—Cold solder used primarily to fill imperfections in casting also can be used to revamp or repair patterns. It permits quick, easy application, and easy working for such jobs as adding additional clearances, providing fillets and radiuses in corners of small master patterns, making heavier runners and repairing pattern nicks. It resists chipping or peeling and adheres permanently to all types of pattern material, including aluminum, plastic, brass, Tamastone and wood.

For More Details Circle No. 3—Page 231

Core Blower: Sutter Products Co., 2005 Westwood Ave., Dearborn, Mich.—Core blower incorporates new features which are said to lower maintenance costs, facilitate operations and increase output. When a core has been blown, sand chamber tilts backward on antifriction bearings for refills. The filled chamber tilts forward again against a positive stop which assures accurate alignment of the chamber and the corebox. Sand refill is controlled by a timer easily adjustable to each core. This feature also eliminates the need for machinery required when sand chamber is transferred to refill. The entire dome of the machine, over the sand chamber, constitutes a reservoir for compressed air and permits an immediate release of air when a core is blown. It also compensates for fluctuations in line pressure. The draw table is raised and lowered by a large squeeze piston that provides counterpressure during the blowing operation. Three-point construction, with two columns in the rear of the machine and only one in the front-center, provides rigid support, yet permits full access to the corebox. When used with the company's double-rollover draw machine, the core blower can operate automatically. It has a 10-second cycle. Core area is 12 x 34 in. with 15 in. maximum core depth, and the draw is 10 in. Cycle is pushbutton controlled and can be manually or automatically operated.

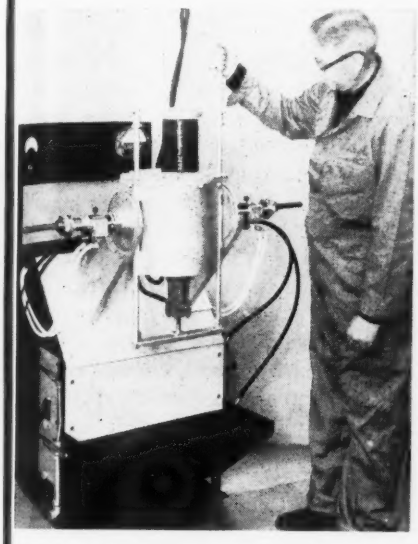


For More Details Circle No. 4—Page 231

SUPPLIES

For More Details on these Items
Use Reply Card—Page 231

Electric Furnace: Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich.—Indirect arc electric furnace, which consists of



a melting chamber and transformer combined into a single unit, is designed for investment casting work. Melting chamber has a two-piece refractory seated in granular insulation and is provided with tubular entrances for electrodes and for pouring. Investment mold clamps onto shell faceplate by compressed air. Operator pours a heat by inverting furnace and allowing molten metal to run into clamped-on mold. An integrating kwh meter shows progress of the heat, and an indicating wattmeter shows rate of energy input. Average melt time is 6 lb in 9 minutes when alloy steels of Stellite variety are being cast. Average elapsed time per heat is 12 minutes. The furnace can be used to cast stainless, chrome-nickel heat resisting steels and alloys used in jet engine parts. Transformer is a 17-kva adjustable reactance, class B, dry type, available for either 220 or 440 v, 50 or 60 cycle, single phase supply.

For More Details Circle No. 5—Page 231

Air Weight Control: Foxboro Co., Foxboro, Mass. — Compensator said to eliminate the effects of blower pulsations on control is now standard on the company's Model 40 air weight control unit for foundry cupolas. Uniform combustion through control of air weight assertedly now is practical even where positive displacement blowers are installed on blast lines. Compensator adjusts action of the control unit, automatically correcting the rate of air flow for variations in atmospheric temperature and pressure. A snubbing device also damps out the throbbing effect which results from the use of certain types of blowers and permits the control unit to respond only to true changes. With the measurement of flow corrected for temperature and pressure effects, the control unit positions a valve in the blast line to admit the desired weight of air to the cupola.

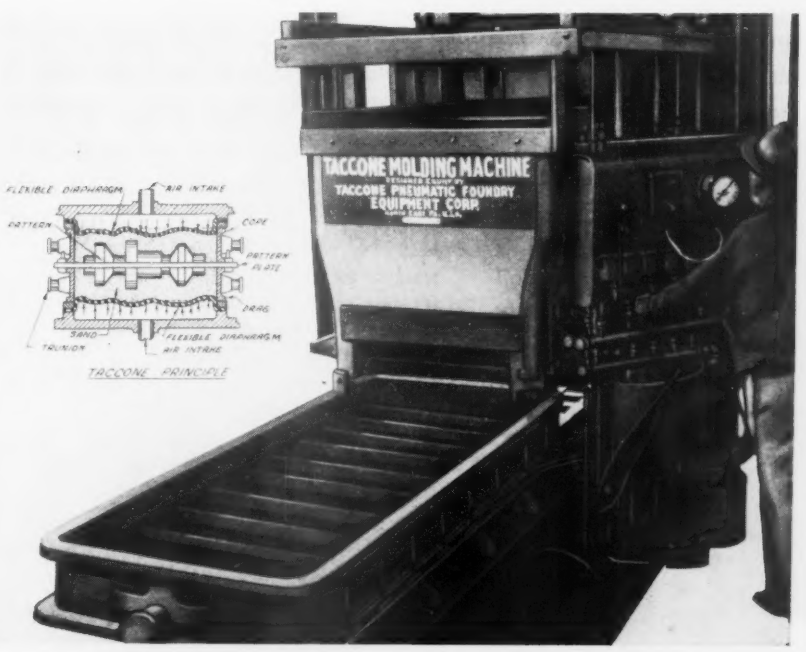
For More Details Circle No. 6—Page 231

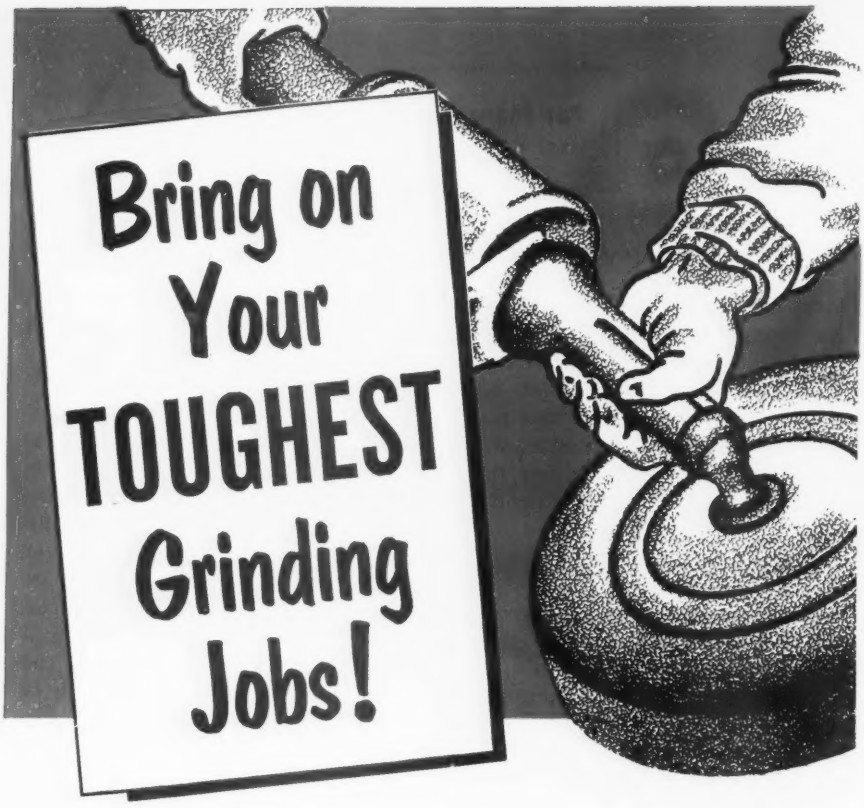
Hardness Tester: Newage International Inc., 235 East 42nd St., New York 17—Metal hardness tester permits superficial testing and direct dial readings in the Rockwell 15N scale, 70-95, with a portable instrument. The tester weighs 30 oz, is 3 in. high and operates with maximum indentation of 0.003-in. and maximum diameter of penetration of 0.006-in. In use, it is placed on the

Squeezer Machine Uses Rubber Diaphragm

MOLDING machine utilizes a rubber diaphragm which may be inflated with air to compress sand in a flask to uniform mold hardness over all pattern contours. Control of air pressure against the diaphragm governs the degree of mold hardness desired. Pattern wear is said to be kept to a minimum, permitting the use of wood or plastic patterns on production runs. Ordinary green sand is used, and, according to the manufacturer, close control is maintained over casting weights. Machine can be moved into a foundry and immediately put into production; no special foundation is required. A production model, handling a flask 36 in. wide, 80 in. long and 10 in. deep, is said to be producing at the rate of 90 complete molds per hour. Maker is Taccone Pneumatic Foundry Equipment Corp., North East, Pa.

For More Details Circle No. 7—Page 231





Electro Specific Purpose Grinding Wheels

Electro Specific Purpose Grinding Wheels challenge the toughest grinding jobs in industry. They are handling everything from snagging to precision work in high-efficiency plants all over the country; and at savings in both time and money, while improving quality of output. It's all a matter of specific wheels for specific purposes. The controlled quality of our own abrasives is a factor worth noting. This coupled with the skill of our engineers establishes the formulas for combining both into standard speed vitrified, or high speed resinoid wheels as the requirements may indicate.

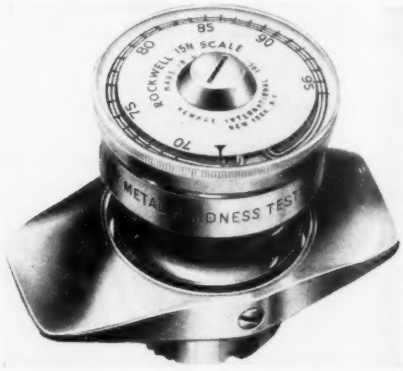
Electro SINCE 1910

May we, without cost or obligation, send a technical expert to learn at job-side exactly what your individual requirements and working conditions are? Write, wire or phone.

Electro Refractories & Abrasives Corp.
344 Delaware Avenue, Buffalo 2, N. Y.
Regional Warehouse: Los Angeles 58, California
Plants: Buffalo, N. Y. and Cap-de-la-Madeleine, P. Q., Canada

R-431

material to be tested, the handgrips are pressed down and the direct reading is obtained from a dial 2 in. in diam. The housing of a spring-loaded diamond penetrator indentor is



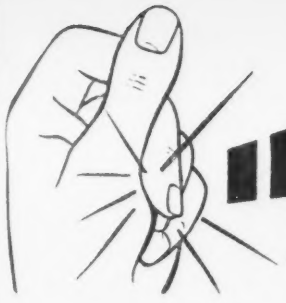
lowered to the surface of the material to be tested when the handgrips are pressed down. Further depression of the handgrips insures that the point of the indentor penetrates the surface of the test material under the action of a calibrated helical spring. The movement of the indentor as it slightly penetrates compresses the diaphragm of a fluid-filled chamber, forcing fluid farther into a capillary tube encircling the dial, thus indicating the hardness number.

For More Details Circle No. 8—Page 231

Wire Rope: A. Leschen & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12— Flattened strand wire rope is said to offer several advantages to users. It presents four wires per strand to the sheave groove in-

stead of one, thereby permitting longer and more even wear. Because strands rest snugly together, they resist crushing better than they would otherwise and undergo less internal

(*Continued on page 233*)



IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

51. Centrifugal Compressors

American Blower Corp.—Here, in 12 illustrated pages, are descriptions, ratings, design features and application data on single stage centrifugal compressors. Sizes are from 30 to 600 hp and pressures from 1¼ to 3¾ lb. Units are shown in exploded form. Controls designed to meet specific requirements are covered.

52. Dry Blender

Patterson-Kelley Co.—A general outline of the shell molding process, its advantages and applications are given in 4-page catalog section 404 along with full description, features and test data on the p-k twin shell dry blender. Featuring an intensifier, blender provides fast and dustless mixing of molding sands—no kiddin'.

53. Send 'Em Home Clean

Bradley Washfountain Co.—Your men, like everybody else's men, get dirty on the job. With the various Washfountains and Multi-Stall showers described and illustrated in folder 24a/Br, they can either wash or shower and go home clean. Folder says that units accommodate from 2 to 10 persons. And small folder Q.914 relates five (5) benefits derived from their use.

54. The Sand Control Mystery

Claud S. Gordon Co.—Not an Erle Stanley Gardner story, this 32-page illustrated booklet "Taking the Mystery Out of Sand Control" is written by H. L. Campbell, a metallurgical engineer. It presents much valuable info on sand, its origin, selection, control and correction of defects caused by unfavorable sand conditions. Actually a junior-size textbook.

55. Through Conveyors

A. B. Farquhar Co., Conveyor Div.—We can't convey to you the capabilities and features of Farquhar through conveyors half as well as 8-page bulletin No. 334-T. It gives you pictures, dimensions and full specs, as well. Conveyors handle abrasive powders, crushed stone, sand, gravel, fine coal, chalk as well as small bags and bundles.

56. Dry Chemical Extinguishers

Ansul Chemical Co.—You can't wait until tongues of flame are creeping up a wall or until, in a flash, that tank of solvents is ablaze to do something about fire protection equipment. If you send for illustrated folders 5117 and 5118 you'll get the dope on hand and wheeled dry chemical fire extinguishers. They can be used by inexperienced operators effectively.

57. Furnaces, Torches, etc.

Johnston Mfg. Co.—Here's a real stack of information on heat treating, annealing, brass melting, car bottom and rotating hearth furnaces, crucible heaters, pressure blowers, vacuum oil burners, oil and gas burners, and heating torches—all for you. Illustrations, general data and specs are given.

58. Foundry Ceramics

American Lava Corp.—AlSiMag bulletin No. 522 on foundry ceramics that withstand heat shock has 4 illustrated pages and lots of data. Strainer cores, gate tubes, troughs and cut-off cores are among products covered. Tables showing sizes available are included.

59. Tailored Cupolas

Grindle Corp.—"Grindle Improved Cupola Order Data" gives all the available dimensions of cupolas which will match your melting needs. Conventional and Verti-melt models as well as stationary and tilting furnaces are detailed.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Helpful Literature" in this issue—simply circle corresponding item numbers on one of these cards

FOUNDRY 2-53

Penton Building, Cleveland 13, Ohio

Please send literature or detailed information on subjects circled at left to—

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COMPANY _____

PRODUCTS MANUFACTURED _____

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Readers' Service Dept.

60. Resonant Conveyors

Carrier Conveyor Corp.—Pepsi has its "bounce to the ounce" and this company has its Natural Frequency vibrating conveyor, described and illustrated in 4-page bulletin 500. Up to 200 tons per hour of bulk materials can be conveyed. Advantages and applications of the conveyors, plus other data, are included.

61. Power Tools

Tomlee Tool & Engineering Co. — You'll not want to miss 28-page catalog 103. In addition to the dope, data, pics and specs on power tools for industry, tells you how to plan your shop and select your tools, how to make machine adjustments, and points out simple safety rules. Tilt arbor and table saws, jig and band saws, jointer-planers, drill presses and accessories, gap bed lathe and disk and belt sander are tools covered.

62. Art of Grinding

Cleveland Quarries Co., Sterling Grinding Wheel Div.—They've got literature on the art and science of doing everything else, so why not "The Art and Science of Grinding." 42-page pocket-size booklet of this title answers 36 questions about grinding wheels; tells how WA & ZA Sterlith, Sterbon, vitrified, silicate and resinoid wheels are made; and covers grades, grains, testing, speeds, pulley speeds and hoods and flanges.

63. Colloidal Graphite

Acheson Colloids Co.—Need a high-temperature lubricant that is inert and will cling stubbornly to sliding or rubbing friction surfaces? Then, consider 'dag' colloidal graphite described in 4-page bulletin 423. Its use in kiln car wheel bearings, forging dies, punches and piercing tools, die casting and wire drawing is covered, as well.

64. Excuse Your Dust

Dracco Corp.—Excuse our dust for telling you that your dust should be recovered or controlled, and 40-page well-illustrated bulletin will give you a line on the line of equipment that will do the job. Outlined are Dracco equipment advantages, and construction, operation and application data. If dust is your dilema, dial Dracco No. 800, the number of this booklet.

65. Underfoot Safety

Rock River Lumber & Grain Co.—Safety Tread Pattern Div.—Do you want to make floor plate, curb bars, safety tread, thresholds, deck plates or similar castings that must have an integral pyramidal diamond or diagonal square safety surface? There's a complete line of safety tread wooden patterns detailed in 6-page illustrated folder. Patterns are available in 8, 10 or 12-in. widths, lengths as specified and seven styles.

66. X-Ray Accessories

Bar-Ray Products, Inc.—72-page illustrated catalog on x-ray accessories, isotope equipment, radiation protection and x-ray film processing systems features comprehensive sections on processing tank combinations, through-the-wall processing systems, special tanks, water coolers and darkroom accessories. It also deals with such new developments as garments of lead glass fabric, industrial inspection units, radioisotope fume hoods, conyevors, laboratories, etc.

67. Optical Pyrometer

Pyrometer Instrument Co. — The self-contained, direct - reading, accurate-to-$\frac{1}{2}$-per cent Pyro optical Pyrometer that gives you a look-see into the hot spots for correct temperature is subject of 8-page catalog 85. Features, operation, applications and specs are given.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

68. Molding Machines & Blowers

"Modern Trends in Molding Machines and Core Blowers" is title of a scintillating article, a FOUNDRY reprint, written by George E. Miller of Osborn Mfg. Co.'s Machine Div. Among other things, he relates the principal objectives or trends in the engineering and designing of these machines.

69. Anthracite Cupola Fuel

With the tightening in supplies of coke, the use of "Anthracite for Cupola Fuel" has been increasing. In this FOUNDRY reprint, Dr. C. C. Wright, an expert on fuel technology, discusses the selection and use of anthracite and offers recommendations to foundries contemplating its use.

70. Producing Ductile Iron

Sort of a foundrified chapter from "True Confessions" is this reprinted FOUNDRY article "Some Experiences in Producing Ductile Iron" written by the pres. and v.p. of State Foundry & Machine Co. You'll learn, as they did, much interesting—and new—information.

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Cleveland, Ohio

1	16	31	46	61	76	91	106	121	136
2	17	32	47	62	77	92	107	122	137
3	18	33	48	63	78	93	108	123	138
4	19	34	49	64	79	94	109	124	139
5	20	35	50	65	80	95	110	125	140
6	21	36	51	66	81	96	111	126	141
7	22	37	52	67	82	97	112	127	142
8	23	38	53	68	83	98	113	128	143
9	24	39	54	69	84	99	114	129	144
10	25	40	55	70	85	100	115	130	145
11	26	41	56	71	86	101	116	131	146
12	27	42	57	72	87	102	117	132	147
13	28	43	58	73	88	103	118	133	148
14	29	44	59	74	89	104	119	134	149
15	30	45	60	75	90	105	120	135	150

FOUNDRY 2-53
Penton Building, Cleveland 13, Ohio

Please send literature or detailed information on subjects circled at left to—

NAME _____ TITLE _____

COMPANY _____

PRODUCTS MANUFACTURED _____

ADDRESS _____

CITY AND STATE _____

This card MUST be completely filled out. Please TYPE or PRINT

(*Continued from page* 230)

friction and consequent cutting of each other. The flattened strands permit a smaller core with about 10 per cent more metal per given diameter than conventional strands. Relatively smooth circumference prevents corrugation of sheave groove.

For More Details Circle No. 9—Page 231

Safety Goggles: American Optical Co., Southbridge, Mass. — Safety goggles available on special order provide frontal and lateral

protection through a clear, plastic lens and transparent green, vented binders which fit snugly to the face. Wearer has a clear front view and can readily see to the side, though his eyes are shielded against glare by the green coloring of the binders. Goggles give protection over a wide area against flying foreign particles and spattering chemicals in many operations, including light machine and hand tool work.

For More Details Circle No. 10—Page 231

Snowplow Attachment: Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.—Snowplow attachment is designed for use

on all the company's pneumatic-tired fork trucks except the 1000-lb model for loading trucks. The plow is a nonhydraulic attachment mechanic-

Savings Tips from HYDRO-BLAST

Cleaning Room Bottle-Neck Hydro-Blasted

"Our cleaning room was a bad bottle-neck," says General Iron Works of Denver. "Even with several chippers working full time, production was seriously retarded. Hydro-Blast was installed—and got results: 15 tons a day cleaned easily, chipping is on a day-to-day basis, manhours reduced more than 50% —and no more dust!" Can you get the same benefits?—probably. There's an easy way to find out—ask us.

Air Cleaning Called "Unbelievable"

A row of eight Hydro-Blast nozzles aimed horizontally a few feet above a shake-out table, is disposing of dust with an efficiency described by state hygiene officials as "unbelievable" —in one of the country's biggest steel foundries. The Hydro-Blast streams entrain shake-out dirt, and pull dust from adjacent air. An angular wall opposite deflects the streams into a sump, where dirt is settled out and water is recovered. This unusual application is of interest not alone to foundries but to all other industries faced with a dust hazard.

Cleaning Time Cut 65%

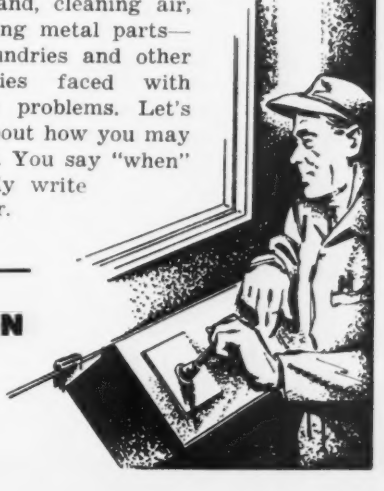
Time studies of cleaning castings of a variety of sizes and types, made by The John Bertram & Sons Co., Ltd., of Dundas, Ontario, showed that Hydro-Blast cut cleaning time an average of 40 per cent; and on one job, a 42" planer bed casting, cleaning time was reduced 65 per cent. Nothing unusual here—it's happening wherever Hydro-Blast is installed.

Hydro-Blast Is Custom Built to Meet Your Needs

It's important to keep in mind that a Hydro-Blast installation for cleaning castings or for reclaiming used sand, is engineered to fit the user's individual needs. There are no "package" units—except in the case of cabinet models. Each installation carries with it the services of an engineering staff whose knowledge and experience are, we firmly believe, without parallel. That a strong affinity exists between your operations and Hydro-Blast is an agreeable probability; and, equally pleasant, it costs practically nothing to find out—just a modest time investment that almost invariably leads to sizable cash benefits.

Write a Letter...

Our business is to save money —big money—in the fields of cleaning castings, reclaiming used sand, cleaning air, deburring metal parts— for foundries and other industries faced with similar problems. Let's talk about how you may benefit. You say "when" —simply write a letter.



HYDRO-BLAST CORPORATION

2550 North Western Avenue

CHICAGO 47, ILLINOIS

ally adaptable to uneven ground surfaces and manually adjustable to several blade angles. The ballast box, mounted directly over truck forks, can be loaded with any kind of material to provide drivewheel traction. Blade assembly is attached to the plow mounting assembly by a single vertical pin, around which the blade can be rotated for angle adjustment. It is 3/16 in. thick and 23½ in. high. Pushing blocks, located at the base of the plow assembly, enable the blade to exert maximum force at the base of the snow load, where resistance is greatest. The plow is detachable as a unit and requires no tools for mounting or dismounting. It also can be used for grading, back-filling and other light yard maintenance operations.

For More Details Circle No. 11—Page 231

Welding Torch: Linde Air Products Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17 — Water-cooled torch for inert gas-shielded arc welding has a rated capacity for continuous duty of 300 amp. Either high frequency stabilized alternating current or straight polarity direct current can be used. The torch is

designed for welding practically all commercial metals up to about ⅛-in. thick. Head and handle assembly weigh only 12 oz. Water circulation prevents overheating. Electrodes can be changed or adjusted in a few seconds, without wrenches. The entire torch body is sheathed in plastic to protect the operator from electric shock, and plastic on the water jacket prevents arc flashover between jacket and the electric ground.

For More Details Circle No. 12—Page 231

Unit Cleans Electrostatic Dust Precipitators

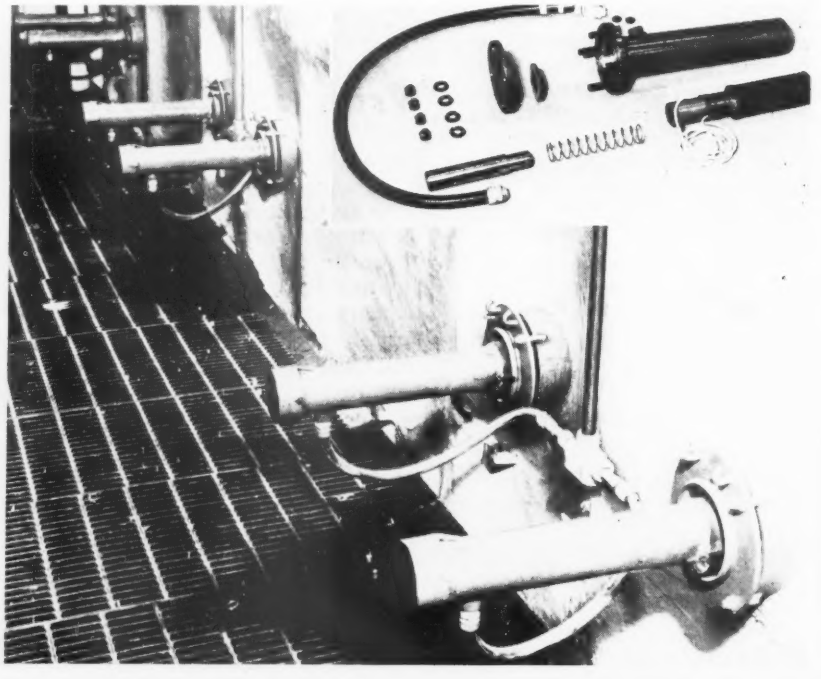
PULSE generator has been adapted to electrode rapping for standard electrostatic dust precipitators in cupolas and in open-hearth, electric and iron ore sintering furnaces. Arrangement for continuous rapping consists of a number of sectionalized banks of collecting plate electrodes. Each bank is rapped in sequence, with a fast rapping cycle of a minute or less for the entire precipitator. Rappers for both plate and high-tension electrodes are operated from the same power supply source.

The rapper unit is a solenoid electromagnet consisting of a steel plunger held in normal position by a steel spring and surrounded by a concentric coil, all enclosed in a hermetically sealed steel case. The rapper case is welded to the end of a rapper bar protruding through the precipitator shell and horizontally connecting a group, or bank, of collecting plate electrodes. When each magnet coil is consecutively energized by a short current pulse supplied from the power and control unit, the plunger is driven rapidly against the rapper bar and thereby produces the shock vibrations necessary to dislodge dust accumulated on plates.

Frequency of rapping is controlled by the circuit constants and the speed for the distributor switch. These may be adjusted to suit the particular installation, which can involve up to 24 units operating from one power supply. Operation is automatic.

Illustrated is a six-unit system; insert shows basic components of a rapper unit. The magnetic rapper was developed by Research Corp., Bound Brook, N. J.

For More Details Circle No. 14—Page 231



Wood Fasteners: E. B. Packard Co., Dept. F, 139 Cedar St., New York 6 — Wood fasteners can be countersunk instantly and uniformly to correct depth with a simple, inexpensive countersinking tool, according to manufacturer. Packing resultant narrow slots with wood filler or putty conceals fasteners, prevents rust and leaves no exposed metal to crack paint or interfere with planing or sanding of surfaces. Fasteners are made of hard steel, ⅜-in. in depth and are suitable for use in any woods up to 2½ in. thick. Installed with an ordinary hammer, they draw wood together as they are driven in and make a tight joint. Countersink consists of a hard wood holder on which is mounted a hardened steel driving piece with the same contour as the fastener. A slot in the holder of the tool engages the fastener and guides the impeller.

For More Details Circle No. 13—Page 231

Variable Speed Motors: Reuland Electric Co., Alhambra, Calif.—Motors are available in either two, three or four-speed ratings and pro-

(*Continued on page* 236)

THE CENTRIFUGAL CASTING MACHINE CO.

P. O. BOX 947

TULSA, OKLAHOMA

To Foundrymen Everywhere

Subject: Experimental Centrifugal Casting

Gentlemen:

Our experimental foundry has been in operation for the past eight years, solely to develop and improve centrifugal casting machines and processes.

The facilities of our experimental foundry are now offered to you on a new service basis:

We will act as your pilot plant and make your experimental or trial centrifugal castings - either ferrous or non-ferrous - using our facilities and "know-how". The work will be done at cost, and the results held in strict confidence.

By utilizing our experimental foundry, which is completely equipped with the various types of centrifugal casting machines, you will be able to learn exactly the possibilities and practicability of making your castings by the more economical method of centrifugal casting.

Your inquiries are cordially invited.

Very truly yours,

THE CENTRIFUGAL CASTING MACHINE CO.

Nathan Janco
President

NJ/rmj

(*Continued from page 234*)

vide further versatility in various torque - horsepower - speed combinations. Constant torque type is used on equipment when loads require nearly constant turning effort, regardless of the motor's speed. With this motor, the hp output varies directly with the rpm. Variable torque is especially suited to power loads that develop and maintain their momentum. With such loads, a reduction in the operating speed is accompanied by a much greater reduction in required operating horsepower. Constant horsepower type is utilized on equipment which must maintain the same horsepower, regardless of operating speed. All the company's motors are now available in two, three or four speeds in any of these types. Motor sizes range from ½ to 150 hp.

For More Details Circle No. 15—Page 231

Circular Saw: Henry Disston & Sons Inc., Unruh & Milnor Sts., Philadelphia 35—Circular saw is specially designed for cutting nonferrous metals (copper, brass, aluminum, magnesium and bronze) or plastics (Formica, Masonite, Lucite, Plexiglas and Micarta). It is precision made from high-carbon, high-chrome steel with edge-holding qualities said by the manufacturer to be superior even to those of high-speed steel. It is available in diameters of 6, 8, 10, 12 and 14 in.

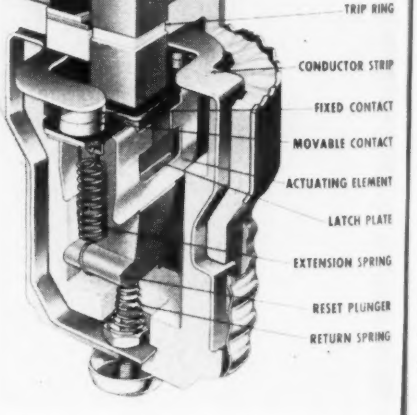
For More Details Circle No. 16—Page 231

Safety Gloves: Boss Mfg. Co., 221 West First St., Kewanee, Ill.—Work gloves with extra long leather fingers and a ⅝-in. steel ball sewn

into the end of each finger protect fingers against crushing in much the same way that safety shoes protect toes. They are especially designed for handling heavy metal sheets and shapes. Two styles are available, one with a 5-in. gauntlet cuff, the other with a 2½-in. safety cuff.

For More Details Circle No. 17—Page 231

Circuit Breaker: Mechani Products Inc., 1824 River St., Jac son, Mich.—Permanent type circuit protective device fits like a fuse in any standard Edison base fuseholder delivering up to 125 v ac and requires no additional equipment or special wiring when applied to



branch or main circuits of corresponding 15, 20 or 30 amp ratings. Anyone can install it in seconds and restore electric service simply by pressing in, then releasing its shock-

new... for shell molding

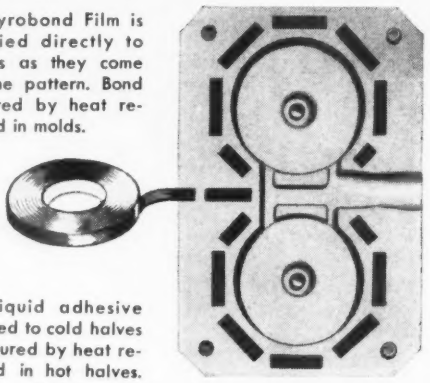
PYROBOND adhesive BONDS Shell Mold Halves...

gives you these important advantages

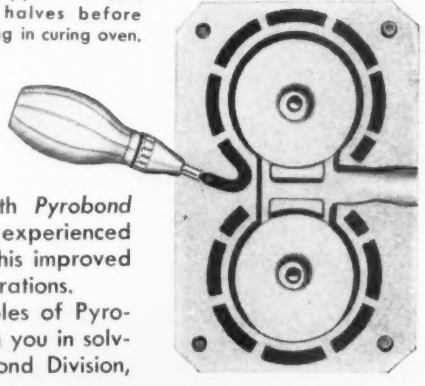
1. Tighter, more uniform closure of mold halves; eliminates need for bolts and clamps.
2. Seals closely and securely around mold cavities.
3. Eliminates need for shot or silica backing in most cases (a critical problem in shell molding).
4. Simplifies reclaiming process; adhesive disintegrates . . . no bolts or clamps to recover.
5. Bonded molds easy to handle and store.

TWO methods of bonding molds with PYROBOND adhesive

1. Pyrobond Film is applied directly to halves as they come off the pattern. Bond is cured by heat retained in molds.



2. Liquid adhesive applied to cold halves and cured by heat retained in hot halves. Also applied to both cold halves before placing in curing oven.



The superior results obtained with *Pyrobond Adhesive* have been proved by experienced shell molders who are now using this improved sealing procedure in their own operations.

Write for full details and samples of Pyrobond Adhesives. We will work with you in solving your problem. Write to Pyrobond Division,

WB WORLD BESTOS
NEW CASTLE, INDIANA

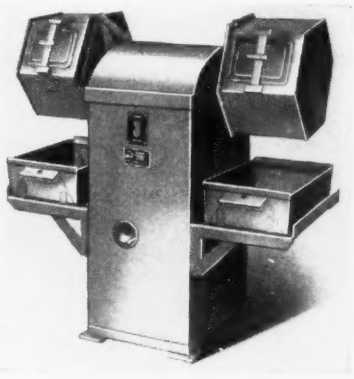
proof reset button. The device is listed as a "circuit protector" by Underwriters' Laboratories Inc. and bears its label of approval.

For More Details Circle No. 18—Page 231

Vise Jaws: Magne-Grip Tool Co., 4900 West Madison St., Chicago 44—Soft jaws for vises use built-in, permanent magnets to snap them into position quickly and easily. They hold securely and can be lifted off simply. A two-way groove locks the work in and holds it in any position desired, regardless of size or shape. Made of an alloy that won't mar, scratch or gouge delicate finishes or highly polished metals, the jaws resist wear and maintain holding power, but can be refaced easily if necessary.

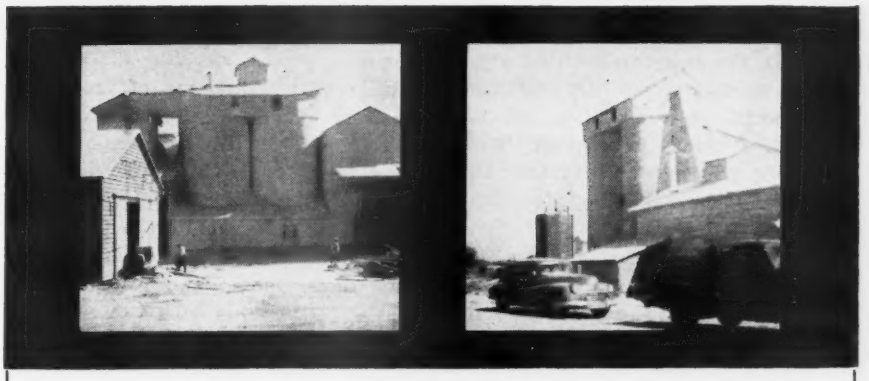
For More Details Circle No. 19—Page 231

Tumbling Machine: Rampe Mfg. Co., 3320 St. Clair Ave., Cleveland 14—Tumbling machine with twin barrels will handle steel burnishing balls in both barrels. It has a ball bearing variable speed drive powered by a ¾-hp, 220-v, 3-phase motor. Starting button is waterproof. Standard barrels furnished with the machine are 10¾ x 17 in., and larger barrels can be supplied when desired. They are furnished unlined or lined with vinyl plastic. A safety type cover prevents pressure from building up in them. Standard equipment includes two tote boxes for emptying barrels and perforated covers for draining.



For More Details Circle No. 20—Page 231

Masonry Saws: Eveready Briksaw Co., Dept. 244, 1509 South Michigan Blvd., Chicago 5—Masonry saw incorporates a high capacity centrifugal water pump which the manufacturer says sweeps dust and material particles away in a constant water spray, leaving the entire work area entirely dustfree. A hinged blade guard serves as a protective shield and diverts water spray from



The stuff in these Neff & Fry Silos affects you

Maybe it's in the coating of this paper. Maybe it's in your waders. Maybe it's in your house paint. It's the substance of your chinaware. It's probably in your face powder. . . . Clay! The purest, whitest variety is known as kaolin.

We've built scores of silos for producers and users of pulverized and granulated clay. Like other fluffy material, it has to be moved with conveyors and blowers. What's more, it has to be kept clean and dry.

Note in the accompanying photos that the head houses containing heavy machinery are carried by the Neff & Fry silos without extra support. This is possible because the silos have great load-bearing ability. Each of the Super-Concrete Staves has a guaranteed crushing strength of 5,000 p.s.i.

Neff & Fry Silos have so many advantages that we can't enumerate them in this space. Our folder, "Bins With the Strength of Pillars," gives all the facts. Ask for a copy.

THE NEFF & FRY CO. • 214 Elm St. • Camden, Ohio

SUPER-CONCRETE STAVE STORAGE BINS

Recirculation Heating Produces More Uniform, Faster Drying

in GEHNRICH CORE OVENS

The large volume heated air recirculation produced by convection heating in Gehnrich Ovens assures drying uniformity that strengthens cores and molds. This also results in faster production and saves fuel.

Gehnrich Core Ovens are streamlined, heavily insulated, efficient, rugged. Available in any desired size from small cabinet or rack loading models to the large car type or continuous conveyor ovens; gas, oil or electric heating. Let us help you.

Get This Catalog

W. S. ROCKWELL COMPANY
2263 Eliot Street • Fairfield, Conn.

the operator. Where dust is not objectionable, the saw can be used dry. If it is purchased for dry cutting only, a complete wet cutting kit is available for quick installation. The water pump need not be disconnected when the machine is used for dry cutting.

For More Details Circle No. 21—Page 231

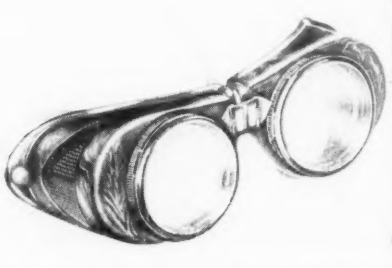
Blacking Compound: Special Chemicals Corp., 30 Irving Place, New York 3—Compound is said to produce a uniform, rich black finish on any ferrous casting or assembled unit consisting of different types of iron and steel. Because it is compatible with all types of iron and steel, no changes in processing are necessary. A replenishing salt maintains the solution in proper balance and insures against off-color deposits. An inhibition agent protects workers and keeps the solution from running down outside the tank. The substance does not affect dimensions or surface texture and will not chip, peel or scale during or after welding, soldering, bending, punching, stamping or rolling. It increases wear resistance of ferrous metals, acts as a base for lacquers, varnishes and other organic coatings and makes metals impervious to alkalies, solvents and high temperatures.

For More Details Circle No. 22—Page 231

Marking Ink: John P. Nissen Jr. Co., Glenside, Pa.—Fast drying marking ink is said not to chip or peel and to be unaffected by heat or weathering. Made for use on materials that are to be marked permanently, it can be employed on rough castings, bar stock, machinery, jigs, tools, wood, plastics and other substances. The ink comes in a burstproof tube with a ball point attachment especially designed for marking rough materials. Different sizes of ball points are available, and the ink can be obtained in six colors.

For More Details Circle No. 23—Page 231

Safety Goggles: Chicago Eye Shield Co., 2300 Warren Blvd., Chicago—Safety goggles with wider bearing surfaces in the molded plastic frames eliminate pressure points and provide a seal which keeps out flying particles and light flashes. Different goggles are available for welders and for chippers. Those for chippers are ventilated indirectly through slotted lens rings, directly through perforated side shields. Welding and dust models are indirectly ventilated through side shields. Both models have large air space within the goggles to reduce fogging. Lenses are quickly replaceable from the front. Standard 50 mm lenses



AJAX-WYATT ELECTRIC FURNACE

This line frequency induction furnace, so universally used in the wrought brass industry, is now, because of improved linings, available for melting ferrous alloys used in the foundry industry.

AJAX ELECTRIC FURNACE CORPORATION
1108 FRANKFORD AVE., PHILADELPHIA 25, PENNA.

Associate Companies:
AJAX *Electro Metallurgical Corporation*
AJAX *Electrothermic Corp.*
AJAX *Electric Co., Inc.*
AJAX *Engineering Corp.*

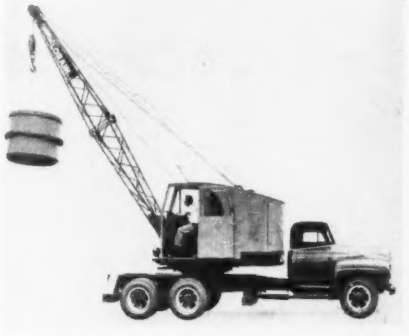
are seated flush with rings to deflect flying objects. Three adjustable headbands are offered.

For More Details Circle No. 24—Page 231

Safety: Continental Can Co., 100 East 42nd St., New York 17—Hot drink cup made of paper tells two brief safety stories on each cup. Printed in red and green, "Life Guard Oscar," a little man made of tin and paper containers, gives word of advice to workers like "Production Teamwork Wins in Safety Too!", "Clean Aisles Are Safer!", "It Pays to See the Nurse," and "Keep Your Eyes on Your Work, Avoid Waste and Accidents!" The drawing and slogans are intended to catch the eye and leave an image in the minds of relaxing, unabsorbed workers.

For More Details Circle No. 25—Page 231

Truck Crane: Thew Shovel Co., Lorain, O.—A 6-ton truck crane just added to the company's line consists of a complete superstructure equipped as a lifting crane which



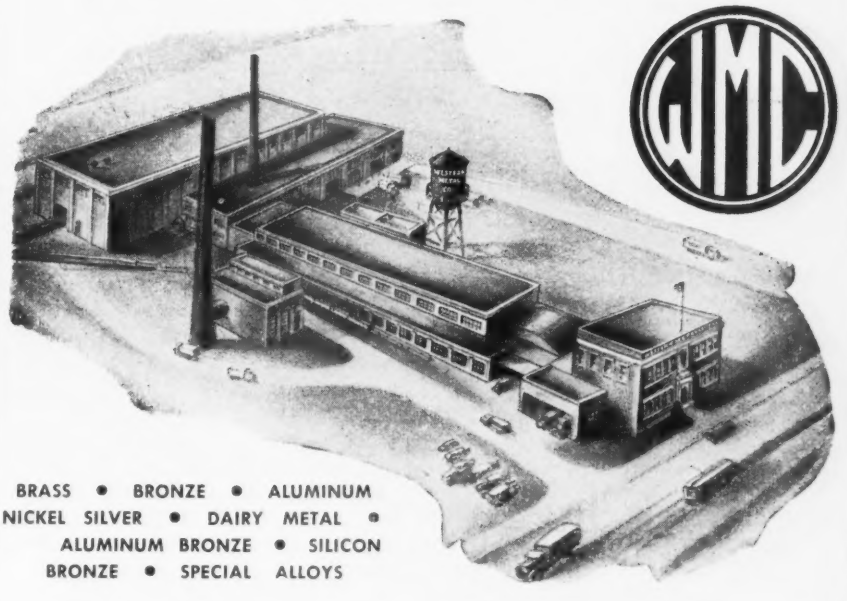
can be used also as a ⅜-yd dragline or clamshell. Designed primarily for field mounting on a suitable new or used truck furnished by the customer, it has such other applications as mounting on piers, barges, bins, ship docks, trailers, flat cars and similar locations. Incorporating all the qualities of the company's other products, it is a two-drum, gasoline-powered machine fully equipped with a 25-ft, two-piece butt-flange-connected boom. Center sections can extend the boom to 45 ft. A tagline for clamshell service, a fairlead for dragline service, a precision power boom lowering device and other extras also are avaliable.

For More Details Circle No. 26—Page 231

Safety Hat: United States Safety Service Co., 1215 McGee St., Kansas City, Mo.—Safety hat made of Fiberglas offers long life, light weight, comfort and unsurpassed strength-weight ratio, manufacturer

Quality

INGOT METALS



WMC

BRASS • BRONZE • ALUMINUM
NICKEL SILVER • DAIRY METAL •
ALUMINUM BRONZE • SILICON
BRONZE • SPECIAL ALLOYS

WESTERN METAL COMPANY have built their reputation on quality and service.
By using WEMCO SPECIAL DELIVERY SERVICE it is not necessary to carry large inventories for we carry complete stocks of all standard Brass, Bronze and Aluminum Alloys.

We provide complete laboratory service as well as experienced field metallurgists to help you produce the quality castings necessary to insure the high standards of today's requirements.

It will pay you to check with WESTERN.

WESTERN METAL COMPANY
2201 SOUTH KEDZIE AVE. CHICAGO 23, ILLINOIS

SMELTERS AND REFINERS OF BRASS AND ALUMINUM INGOTS

says. Its resiliency is said to prevent cracking and splitting. The company states that it meets the ASA Code standards for dielectric breakdown and exceeds the standards for impact resistance. Cradle of the hat can be adjusted quickly and easily to fit all head sizes.

For More Details Circle No. 27—Page 231

Suspension Furnace: Jackson & Church Co., Saginaw, Mich. — Warm air suspension furnace said to be capable of producing 1 million Btu at bonnet and of handling 12,500 cfm of tempered air has been added to the company's line. Each burner of a twin oil burner arrangement fires into a separate stainless steel combustion chamber at the rate of 4½ gph. A model designed for 800,000 Btu output at 7 gph also is available. The twin burners make possible economical use of only one burner during mild weather. Burners are electronically controlled with electric eye protection. The new unit measures slightly over 9½ ft long by 55 in. wide by 52 in high. The furnace uses a 25-in. blower and a 5-hp, 1750-rpm motor. Four rectangular tubes carry the air around flue passages measuring 58 in. long, 40 in. wide and from 1½ to 2¾ in. in depth.

For More Details Circle No. 28—Page 231

Liquid Resin: Durez Plastics & Chemicals Inc., 1009 Walck Rd., North Tonawanda, N. Y.—Phenolic type liquid resin for sand core bonding is said to be low in cost and to possess long storage or shelf life, excellent bond strength and low volatility. Manufacturer states that cores made with this resin have proved suitable for use in making castings from aluminum, bronze, gray iron, malleable iron and steel. Although the resin is soluble in water, cores made from it have good water resistance after curing in ovens or dielectric dryers.

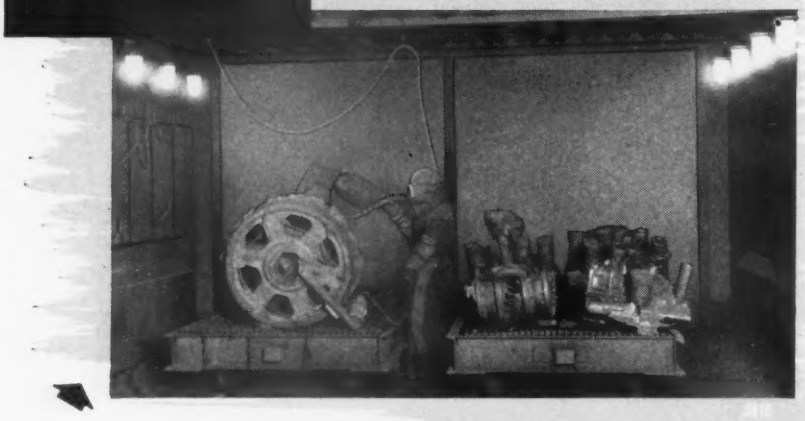
For More Details Circle No. 29—Page 231

Barrel Skid: Magline Inc., Mercer St., Pinconning, Mich.—Fabricated entirely of magnesium, barrel skid combines light weight and ease of handling with certified, capacity-rated strength. It is of welded construction throughout. Manufacturer asserts that it speeds handling of drums and barrels, reduces the risk of lifting injuries and assures greater safety to men and equipment. Skids are available in standard sizes from 5 to 18 ft long or in special sizes.

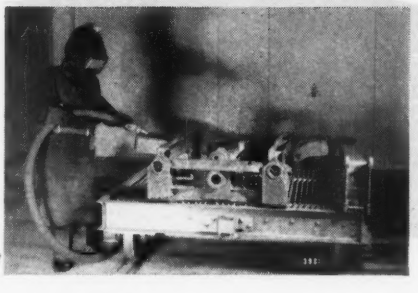
For More Details Circle No. 30—Page 231

Work Glove Coating: Edmont Mfg. Co., 1274 Walnut St., Coshocton, O.—An improved reinforced neoprene coating is now being used on the firm's complete line of black

SLY ARMOURED* BLAST ROOMS



A 16' x 16' Sly Blast Room with double track for two cars. Both cars can be used for a single large casting. Note how perforated floor plates keep coarse refuse from entering hopper below.



This view shows a Sly Blast Car in a Sly Blast Room. Perforated floor plates are supported by grating preventing plates from warping. Observe how tops of rails are flush with floor. Operator wears a Sly "Purair" Helmet.

Whatever Size Your Castings

And whatever your tonnage we have a standard blast room to suit. We have built blast room equipment for the cleaning of the inside of tank cars, for large airplane fuselages, for structural assemblies, tanks, railroad cars and locomotives. Some large blast rooms are self-contained buildings.

STANDARD SLY BLAST ROOMS

Inside width: 8 ft., 10 ft., 12 ft., 14 ft., 16 ft. • Inside Length: 8 ft., 10 ft., 12 ft., 14 ft., 16 ft. Inside Height: 7 ft. 3 in., 8 ft. 3 in., 9 ft. 3 in. • Larger Blast Rooms for special purposes.

*ARMOURED — An extra layer of detachable 3/16" steel wear plates to protect the walls. • An extra layer of steel grating to reinforce the floor against sagging. (Exclusive Sly features)

THE W. W. SLY MANUFACTURING CO.
4753 TRAIN AVENUE • CLEVELAND 2, OHIO
BRANCHES IN:
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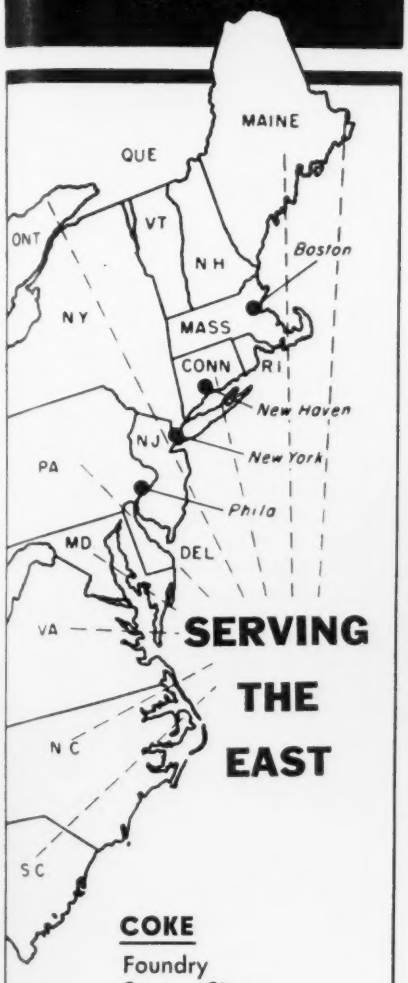

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For More Details Circle No. 31—Page 231

Tractor: Moto-Truc Co., 1978 East 59th St., Cleveland—Tractor which can be walked or ridden enables operator to walk the tractor and load on short hauls and to ride when the run is longer. It is manufactured with either a 12 or an 18 v

battery. The 12-v model is 27 x 48 in. overall and has two speeds, with a maximum of 3½ mph. The 18-v model has two walking speeds and a third, for riding, of 4½ mph. It is 31 x 48 in. When released, the operating handle automatically goes to an upright position, sets the brake and cuts the motor. Short wheel base permits minimum turning radius. Operator can enter from either side; guard rails protect him both front and rear.

For More Details Circle No. 32—Page 231

Surface Plates: Lawley Granite Surface Plate Co., 1412 Packard Bldg., Philadelphia 2—Surface plates made from dense, hard, uniformly grained black granite have a guaranteed surface accuracy of up to 0.00005-in. Designed to permit extremely precise measurements in quality control, manufacturing and inspection, they will not rust or warp, regardless of temperature changes or shock. They resist abrasion and impact and do not develop humps or burrs that must be removed. The smooth surface permits easy movement of instruments, and the nonglare finish prevents reflections. The plates are nonmagnetic, require no maintenance and assert-

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edly retain their surface accuracy for years. They weigh 190 lb per cu ft and are available with two or four lips and in standard sizes from 4 x 12 x 18 in. to 6 x 24 x 36 in. Other sizes can be obtained on special order.

For More Details Circle No. 33—Page 231

Band Saw: DoAll Co., 254 North Laurel Avenue, Des Plaines, Ill.—Large capacity band sawing machine designed principally for rapid, heavy-duty cut-off work uses a saw blade twisted 90 degrees from conventional position at the work table. Work is fed to the blade

from the front of the machine, and the length of stock that can be cut is not limited by the throat capacity. It will handle ferrous or nonferrous metal of any shape, the manufacturer says. Changing the saw guides to eliminate the twist from the blade and moving the table to a "neutral" position readily converts the machine to conventional high or low speed, straight or contour sawing. The saw accommodates work 15½ in. thick under the saw guides and 9½ in. thick at the column. The 40 x 48-in. worktable is hydraulically powered and can handle work weighing up to 1 ton. A three-speed transmission and a 10-hp variable speed drive permit a speed range from 40 to 10,000 fpm. Saw bands up to 1¼ in. wide may be used on the machine.

For More Details Circle No. 34—Page 231

Masonry Saws: Clipper Mfg Co., 2800 Warwick, Kansas City 8, Mo.—New model dustless masonry saw incorporates two devices, one to cushion the blade automatically and another to permit easy adjustment of the cutting head to any height desired. Other features include a factory sealed water pump that operates either wet or dry and a blade

guard that serves as a safety device and eliminates water spray during wet cutting. According to the manufacturer, one operator and one of the new saws can keep a full crew of masons supplied with perfectly cut firebrick. Because the machine is dustless, it can be operated next to the job.

For More Details Circle No. 35—Page 231

Multipurpose Grease: Shell Oil Co., 50 West 50th St., New York 20—Multipurpose grease with lithium 12-hydroxy stearate base is said to possess exceptionally high resistance to breakdown. Manufacturer states that it has been known to maintain peak consistency and lubricating qualities with as much as 32.5 per cent water present. It achieves high pumpability and movement at low temperatures and undergoes no phase change as temperature rises to high melting points. Rate of oxidation is low, induction period is long and storage stability excellent, it is claimed.

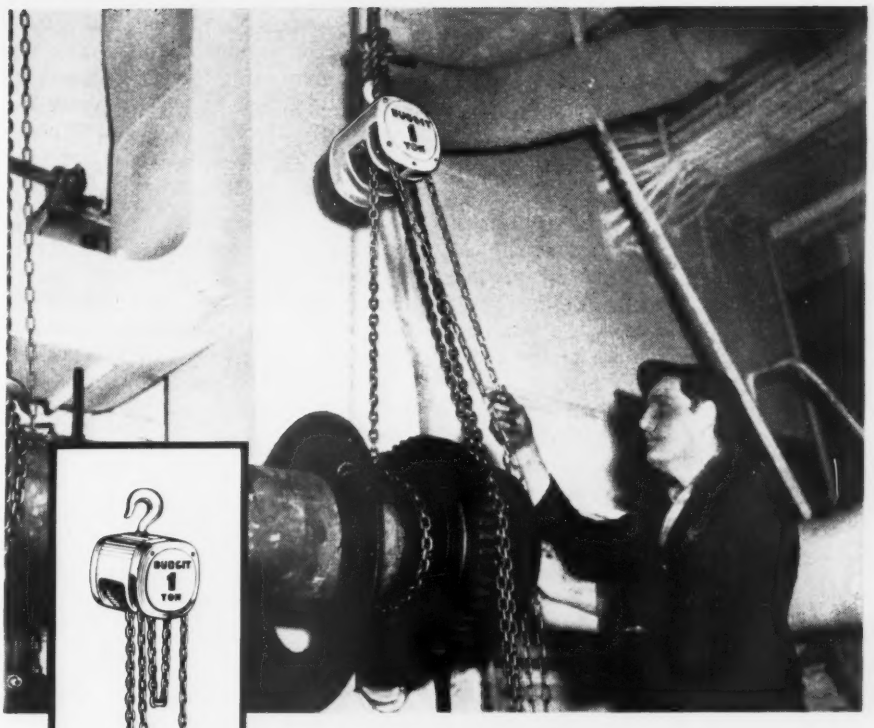
For More Details Circle No. 36—Page 231

Load-Pusher: Baker-Raulang Co., Baker Industrial Truck Division, 1230 West 80th St., Cleveland 2—Fork truck load pusher attachment is designed to speed the handling of bulky, unpalletized loads and the loading of highway carriers unable to accommodate fork trucks. Loading highway carriers which fork trucks cannot enter, the operator pushes loads into the carrier, and subsequent loads move forward the first ones. A free-floating jack actuates and equalizes the action of two sets of levers that move the pusher arms. Positive control over pushing pressure is said to be available from the driver's position through use of a metering valve. Load capacity of the truck is reduced 10 per cent by installation of the pusher.

For More Details Circle No. 37—Page 231

Machinery Cleaner: Shaler Co., Waupun, Wis—Solvent is said to clean electric motors and generators while they are still assembled. According to manufacturer, a motor may be submerged completely in the cleaner, then plugged into electric current, allowed to run for from 3 to 5 minutes, removed from the dip tank and dried with compressed air. Alternately, the cleaner may be sprayed into the intake side of a motor while it is in operation. The cleaner reportedly does not affect wiring or insulation which is resistant to gasoline or oil.

For More Details Circle No. 38—Page 231



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Principles of Risering

(*Continued from page* 107)

Williams riser, represented in the upper view in Fig. 11. This technique provides a blind riser with a means of keeping interior metal under atmospheric pressure. In the illustration, this is accomplished by a round stockcore rammed up or inserted after molding so that it projects toward the center of the riser. Since this core comes up to the temperature of the metal before it begins to solidify, the metal does not solidify around the end of the core. The core's permeability permits the provision of atmospheric pressure to the liquid metal in the center of the riser. Cutting a V-groove or notch across the top of the riser can achieve the same results.

In steel casting, a graphite pin sometimes is used. This pin serves a dual purpose in that the dissolved carbon also lowers the solidification temperature of the steel surrounding the pin. The success of this system depends on the fact that the center of the casting is under a partial vacuum during solidification. With the riser under atmospheric pressure metal is drawn into the casting.

It actually is possible to feed a casting uphill by this method. Theoretically, atmospheric pressure can lift molten metal over 43 in., but in real casting that height cannot be approached because the development of a high vacuum tends to draw out some of the gases always present in molten metal. In addition, the hot, freshly solidified wall of the casting would tend to collapse under any approach to full atmospheric pressure.

This type of riser is particularly adaptable to alloys of the solid solution type, thereby explaining its common use in steel foundries. Contrary to some use, the Williams riser is of little value in casting eutectic alloys such as soft gray irons. The inability of eutectic alloys to support an internal cavity under partial vacuum is demonstrated by the fact that most shrinkage in gray cast iron is apparent from the external surface. Center line shrinkage is rare in cast iron and is most likely to have been caused by gas, particularly hydrogen, when it does occur.

Chills Modify Solidification

The rate at which a casting solidifies also can be modified in part by the use of chills, either internal or external, as indicated in Fig. 12. The external chill, often of cast iron or graphite, replaces sand at the surface of the casting in some critical area. Higher specific heat and higher thermal conductivity induce more rapid solidification. External chills can be used many times, but are not satisfactory in some conditions. With cast iron, for example, too rapid cooling induced by an external chill may produce a hard white iron spot on the casting that could not be machined and might crack.

Internal chills are most commonly used with cast iron (when white iron is not deliberately sought) and with steel. Tin plated internal chills of the proper size become part of a casting and are difficult to locate in the metal, even with a metallurgical microscope. However, the difference in hardness may show them up under sensitive machining.

Foundrymen have two tools—the use of insulation and the addition of exothermic materials—capable of producing effects opposite to those of chills. Diatomaceous earth (Sil-o-cell) and mineral perlite are commonly used to insulate the tops of risers. Insulating cores and special molding "sands" made from perlite may be applied to a casting where slower solidification is desired, as

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around risers. Higher casting yields can be obtained by this procedure because an insulated small riser will cool as slowly as an uninsulated larger one. If the riser insulation is extended around the riser neck up to the casting proper, however, it also will insulate the casting, thereby delaying solidification of the casting so that it occurs after that of the riser and produces a defect.

Adding hot metal, exothermic material, insulation or a combination of these elements to the tops of risers is good practice, commonly used. If the riser is too tall, however, the bottom will solidfy at a rate that is little influenced by what is added to the top (cold metal is more dense than hot metal).

Every decade demands more of the business of making metal castings—more difficult alloys, higher quality and more efficient production. Science has contributed greatly to the industry, but practical know-how is the basis of operation. Risering is only one of many foundry techniques in the interim between an art and science. A practical foundryman and a young engineer working together comprise the most effective type of foundry team available.

Book Review

Gates And Risers For Castings, by Pat Dwyer, engineering editor FOUNDRY, 375 pages 6 x 9 in.; 238 illustrations; published by Penton Publishing Co., Cleveland; $6.

This is the second printing of the third edition of a book compiled from material originally presented in serial form in FOUNDRY. The third edition published in 1950, in addition to the material appearing in the first edition, and considerably revised and expanded in the second edition, also contained descriptions of pads and sleeves, knock-off risers, pouring through risers, permanent molds for aluminum, formulas for centrifugal pouring speeds, magnesium casting, vacuum systems, blind risers, risers under pressure, thermotomic feeding, gating malleable iron and precision casting.

The book has been written primarily for the benefit and information of foundrymen who have not had opportunity to study the subject in its almost infinite ramifications. In addition to practically all types of gates and their application, related features are presented to enable the reader to draw intelligent conclusions in relation to his own particular problem or problems. The text is conveniently divided into sections covering gray iron, brass and bronze, aluminum, steel and malleable iron.

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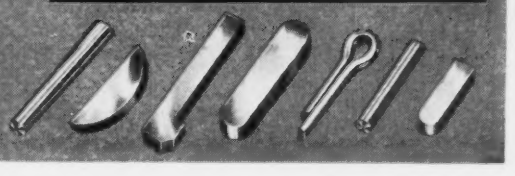

New Roll Foundry

(*Continued from page* 111)

units, one for each furnace, with temperature control.

The coal pulverizing machines run at 1350 rpm and deliver 3000 pounds of pulverized coal per hour at 80 per cent through 200 B.S.S. screen. The hoppers over the pulverizing machine contain 25 tons each, and the raw coal bunkers have a total capacity of 600 tons. Average melting rate of the air furnaces is 2½ to 3 tons per hour.

Two cupolas are used to meet the firm's requirements in tackle and spare parts. The shells have a diameter of 5 ft 3 in. and are at present lined to 36-in. diameter to give 4½ tons per hour. Lined to a 45-in. diameter, they would melt 7 tons per hour at a coke ratio of 10 to 1. The charging platform is 18 ft 6 in. from floor level. Charges are lifted to the platform by means of an overhead traveling crane, weighed on the platform on a truck, and discharged into the cupola.

Air is blown by 30-in. Keith Blackman fans which yield 3000 cfm of air and are designed to permit an increased size of impeller to give 4500 cfm. There is also one rotary oil furnace of 3000 lb nominal capacity which gives three to four heats per day.

In rollmaking, the sand consumption per ton of castings is small compared with general foundry practice. Further, because all molds are dried, rigid control of sand quality is not a vital necessity. To cover all eventualities, however, an adequate and simple sand preparation plant has been installed. This setup consists of two batch type edge mills—one for sand and one for loam.

The sand mill is fed from a 25-ton capacity hopper into which screened used sand is elevated mechanically. New sand is added by hand from an adjacent storage. At present approximately 25 tons of sand is used per day, the mixture being 50 per cent used and 50 per cent new sand. The neck flasks are stripped adjacent to the rotary screen.

Chills Are Hematite Iron

The iron molds or chills used in chill roll molding are made in the company's foundry from hematite iron. These chills must be accurately machined with perfectly concentric bores. Great care is necessary in their preparation. Fine saw cuts on the face act as vents, thus preventing pinholing, and thin refractory dressing must be applied evenly to avoid hot spot effects which can cause cracking of the roll face.

Grain rolls (U. S. sand iron) are cast in loam swept molds consisting of cast iron bricks which produce a pronounced densening effect necessary in these massive castings. Indefinite chill rolls (U. S. grain) are made by the conventional chill roll molding process and casting technique, but the analysis of the iron, usually highly alloyed, is controlled to give the desired physical characteristics.

For drying the molds there are six oil-fired recirculating ovens of the push-through type, 28 ft long, 13 ft 10 in. wide and 10 ft high. The molds are loaded on steel bogies capable of carrying 100 tons. These are drawn into the stoves by independent heavy steel chains actuated by a 15-hp electric motor, through a worm wheel gearbox. The stoves operate at 250-270°C. Temperature is controlled by a thermostatic device which adjusts the oil fuel input. Average drying speed is 10 hours per stove.

When dried, the molds are withdrawn into the casting bay for as-

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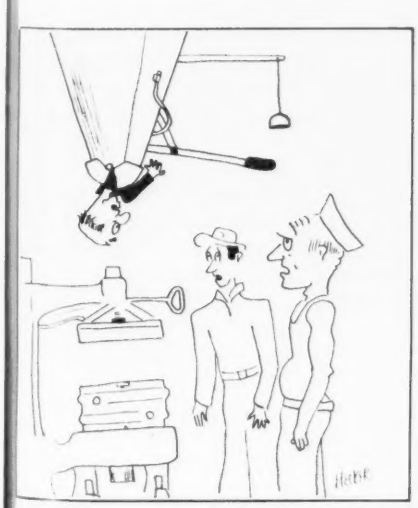
sembly and casting. All the molds are bottom poured along a line of casting pits of reinforced concrete construction, varying in depth from 8 to 20 ft. The ladles for pouring are dried by gas. They carry up to 20 tons of metal. Cleaning of the rough castings is done by hand, with compressed air chipping hammers and swing frame grinders.

The pattern shop and adjacent pattern stores run alongside the molding floor they serve. This shop is well lit and provided with the latest types of patternmaking equipment. The machine shop consists of two bays of 60 ft span and one intermediate bay of 40 ft span. It is designed to carry overhead traveling cranes up to 60-ton capacity. The overall length is 330 ft.

Heating in the main building is by radiant panels. The floor of the storage bay for chills, flasks and foundry rigging is heated to avoid rusting through condensation. The laboratory, staffed by fully trained and qualified metallurgists and research workers, is in an adjacent building. It plays an essential part in the making of rolls in a wide variety of alloys, the composition of which must be strictly controlled from the time of charging throughout the melting process.

Rolls made range from straight carbon chill to alloy chill rolls, indefinite chill or U.S.A. grain type rolls, and also part chill rolls, in which part of the barrel is chill cast and the remainder is cast against sand. The corporation claims to have a roll for any specific application.

At present, the Crewe foundry produces about 175 tons of finished castings per week and melts 250 tons of metal. Production will be about doubled when two new 30-ton air furnaces are in operation.



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1930— First commercial use of gamma rays; radiograph made of sternpost of cruiser "Chester".

1935— First purchase of radium for industrial radiography by Westinghouse; bought from Radium Chemical Co., Inc.

1938— A F A questionnaire revealed that 8% of steel casting men used radium radiography.

1941— 22% of steel casting men bought, rented, leased or employed radium for radiographic purposes.

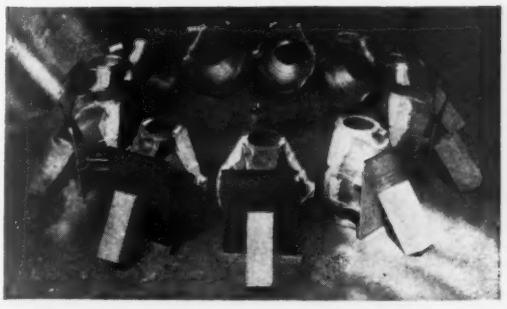
1946— 150 steel foundries rented or leased radium.

1947— American Society for Testing Materials issued Radiographic Standards for Steel Castings. (Gamma Ray). E71-47T.

1948— 200 steel foundries rented or leased radium.

1949— Revision of the U. S. Navy Universal Exposure Calculator for Radium Radiography by N. A. Kahn, E. A. Imbembo and J. Bland, New York Naval Shipyard, Brooklyn, N. Y.

1950— 250 steel foundries rented or leased radium.



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Quality Supervision

(*Continued from page 97*)

the company's attention on a program to alleviate the worsening situation.

Discussion Cards—A weekly training period for supervisors was started. Top management procured the materials, which included guest speakers, moving pictures, literature, and the usual question-and-answer panels. Prior to each session, the foremen were handed typewritten cards outlining the main topics to be discussed at each meeting. Subjects were discussed in this order:

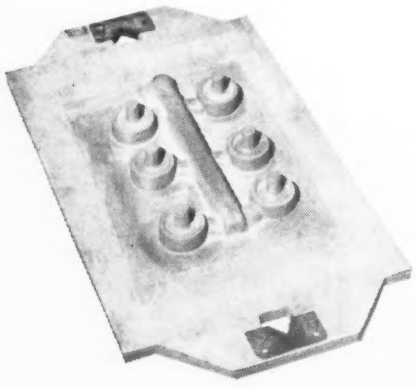
1. As supervisors, you are hired by this company to direct the work of other men. Your job is telling them what to do, when to do it and how to do it—with the correct tools. Although you must understand thoroughly the functions of machines and materials, your most important activity as a supervisor is the understanding of men. We have supervisors primarily because it is necessary to delegate authority and responsibility, and each of you is charged with his own department's production. You must be profit conscious. Production without profit soon results in no production and no jobs. It is folly to expect the bulk of the men you direct to be profit conscious in the sense that it will help the stockholders. They are interested first in their own monetary gains, in *their* profits. It is your function to show these men that their welfare and the company's are linked together.

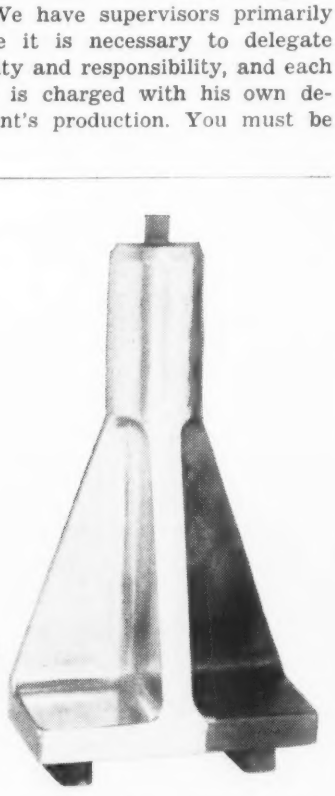
2. The probationary period of new workers requires intensive, thoughtful training. Because of the many conditions encountered in the jobbing shop, the worker may be called upon to learn many new things very quickly each day. Patience is a prime essential. This initial period should never make the employee feel that a club is being held over his head. The sink-or-swim attitude of fellow worker and supervisor must be debunked. The employee should learn periodically about his progress or lack of it. This is the interval when, if his efforts prove fruitless, he should be discharged before the probationary period has expired and he attains a degree of permanency. A surprising amount of money has already been expended on this new worker, and correct training is a must to bring his production in line with established standards.

3. Find out all you can about each employee. All are different. Their educations vary, their work backgrounds reflect different attitudes and their abilities are never the same. Gaining the respect and loyalty of the worker is of paramount importance. When a job is sloppily executed, demonstrate clearly how it must be done. If the job has been exceptionally well handled, praise the man. A few encouraging words go a long way, and they really take little time and effort. Leading and persuading, not driving tactics, are most productive.

4. For a worker to be interested in the company's welfare, he must be made to feel that the company is interested in his welfare. A genuine attempt should be made to understand the employee's home problems as well as his on-the-job problems. Be a good listener to his woes. Make it a practice to visit momentarily with each man. Talk briefly about something unrelated to the job at hand. If this habit is practiced daily, the employee will not automatically stiffen at your every approach, thinking you are going to "eat him out" about some shortcoming. An association built on good will and mutual respect will result in a better utilization of the worker's mental and physical labor—an advantage for employee and company alike.

5. We don't advocate a policy of





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The Photographs show how you can have patterns that work like metal at as little as ONE-FOURTH the cost of metal patterns. Note the Cast Stone Match Plate above (left) coated with one thin coat of MABCO PATTERN PAINT. No finishing was attempted nor was it required to put the pattern into production.

Check the following features —

- √ Quick dry, paint-on metallic Aluminum coating which may be SANDED, FILED OR MACHINED when dry.
- √ May be used to build up or revamp metal or wood patterns.
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- √ Impervious to moisture and most solvents.
- √ Is not affected by synthetic binders.

NOTE The solvent for MABCO PATTERN PAINT and MABCO ALUMINUM PLASTIC is MABCO THINNER.

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coddling a worker. Discipline must be maintained on a fair and firm basis. Never fire a man solely to impress others on the shift. This is a desperate measure, prone to backfire. It is usually more expensive money-wise and goodwill-wise to train a replacement than to *retain* the individual who already knows something about the business, but for various reasons has been difficult. An employee who has adapted himself to the intricate system associated with an everchanging jobbing shop is harder to replace satisfactorily than an employee who, for example, has mastered a few necessary functions on a steady production line.

6. Close supervision is entirely possible without the employee's feeling

that the boss is forever breathing down his neck. You need not stand right over the worker, but be available for help, and be aware of the work going on about you. Postpone your daydreaming until you are out at the lake, fishing. Give your orders clearly and simply. Be ready to explain. Demonstrate why the job must be performed in a particular way. If possible, draw on the individual for comments, whether or not his ideas are usable. Any one mind cannot solve all the problems or come up with all the valuable suggestions. Be receptive to change, if the change is for the better. Grievances, no matter how seemingly trivial, should be dealt with promptly. To ignore them may well stimulate their growth into monstrosities that can upset the entire organization. Should you be unable to cope with the grievance, the matter should be referred to a company official who can take action.

7. The supervisor who tries grandstand methods to throw favorable light on his particular endeavors is riding for a fast fall. Do not "throw mud" at another department to bolster your own. Good work on any shift is the end result of full co-op-

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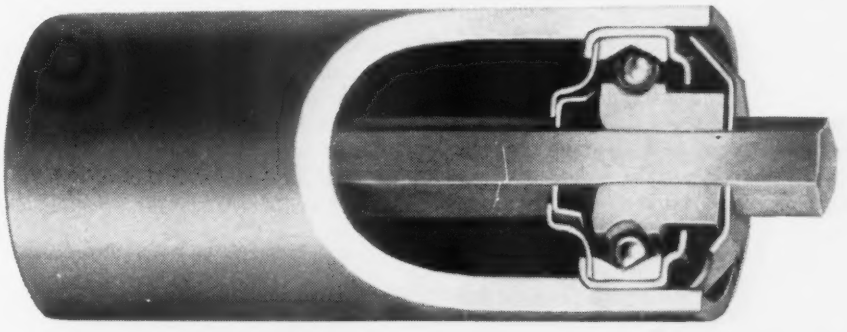
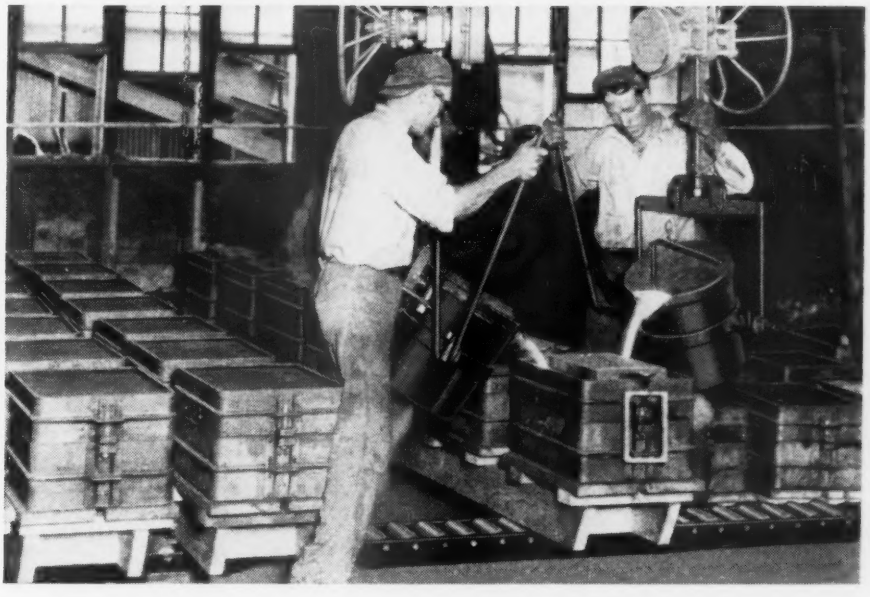
Are Expressly Designed for Foundry Conveyor Service





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eration between each man, between each department. Any trend for improvement or otherwise is noted very quickly by top management without tricks to spotlight it.

8. You would be sure to discipline a worker who had the habit of being absent from work at regular intervals. There is another absentee factor to appraise which is more expensive to the company than mere absence from the job—absence due to injuries. To a large extent, any effective safety program depends upon the quality of supervision. A foundry is a fertile field for accidents unless constant precautions are taken. It is the responsibilty of each foreman to set up and maintain rigid rules for good housekeeping. Each employee must be trained in the safe practice of using tools and handling materials. Be certain to impress upon your men the necessity of reporting all injuries, no matter how slight. Study these injuries carefully and attempt to remedy the cause, so as to avoid repetition.

9. As supervisors you are entrusted with the proper utilization of materials, methods and manpower. Your many decisions must be tempered with caution and reflect what is right in the eyes of management and labor. You must concentrate for peak production coupled with high quality. You cannot do these things alone. The men who work under you must work with you and *for you!*

These cards were handed to each foreman at the weekly supervisor meetings. Frequently the discussions were diverted into innumerable channels for constructive criticism, but the general topic was adhered to until the points outlined were assimilated. After nine weeks of this preparatory training, the company is continuing the sessions, which will deal with human relations and any other problem confronting the foundry.

Evaluating Supervisor Training—This foundry is experiencing an upsurge in production, scrap percentages are progressively smaller, man-hours are falling and morale generally is going up. Customers have commented on the improved service and quality of delivery schedules and castings.

The conclusion to be drawn from this and other experiences is that all expenditures should not be devoted to the mechanical aspect of a foundry. Setting up quality supervision in the small jobbing foundry will tend to balance the important human side of casting production. Together, they comprise an unbeatable team.

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- **Greasing** required only once every six months . . . guaranteed for two years against repairs, exclusive of electrical equipment.

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Elect British Institute Of Metals Officers

The following members of the British Institute of Metals have been elected to fill vacancies on the council of the institute, effective from the 1953 annual general meeting.

President—F. C. Thompson, professor of metallurgy, University of Manchester; vice presidents—Major C. J. P. Ball, chairman, Magnesium Elektron Ltd., and G. V. Raynor, professor of metal physics, University of Birmingham; members of the council—W. A. Baker, research manager, British Nonferrous Metals Research Association; J. C. Colquhoun, chairman and managing director, Manganese Bronze & Brass Ltd.; E. R. Gadd, chief metallurgist, Engine Division, Bristol Aeroplane Ltd., and the Hon. John Grimston, M. P., director and general manager, Enfield Rolling Mills Ltd.

The council elected Dr. S. F. Dorey, chief engineer surveyor, Lloyd's Register of Shipping, to serve as senior vice president for 1953-54. He will be the council's nominee for the presidency in 1954-55.

Steel Castings

(*Continued from page 96*)

Heads that were not necked down so as to be easily broken from the casting were cut through with toothed cold saws. For this slow and awkward operation, every foundry had a battery of machines in the cleaning room. Sometimes a cold saw would be tied up for half a day or more removing a single head. The castings had to be clamped rigidly in position before cutting began, of course, and often heads could not be placed on the pieces at points where they were badly needed because they could not be reached with the cold saw. These machines now have been superseded by the gas cutting torch.

Thin, abrasive cut-off wheels are used in shops making austenitic chromium and nickel-chromium steel castings which cannot be burned with ordinary cutting torches. To avoid breaking the wheels, all but very small castings must be held firmly in jigs and clamping devices. These machines are also used to some extent to cut heads and gates from ordinary and low-alloy steel castings. The recently developed friction band saws (Fig. 1) which are used for a wide variety of work, are also sometimes employed to cut gates from small castings. Just as in the use of thin wheels, special clamping devices are required for all castings except those that can be set flat and held steady on the table of the machine. Neither of these tools, of course, can be used unless gates or small heads are so located as to be readily accessible to the cutting device. Special gas torches now have been developed that cut the austenitic steels quite readily by feeding metallic powder with the flame, and in general such torches are more satisfactory than thin cutting wheels or band saws.

Cut with Gas Torches

In most modern steel foundries, heads, gates and "padding" are removed from the castings with gas cutting torches, which will reach heads or pads at almost any point on a piece and take them off readily and cheaply. The adoption of the torch has been a most important factor in enabling the steel foundryman to produce sound castings, since it allows him to place heads and pads at the points where they are needed. For a number of years, in fact, solid risers were removed from steel castings so cheaply that foundrymen failed to use necked-down or Washburn heads in many cases where it would have been decidedly economi-

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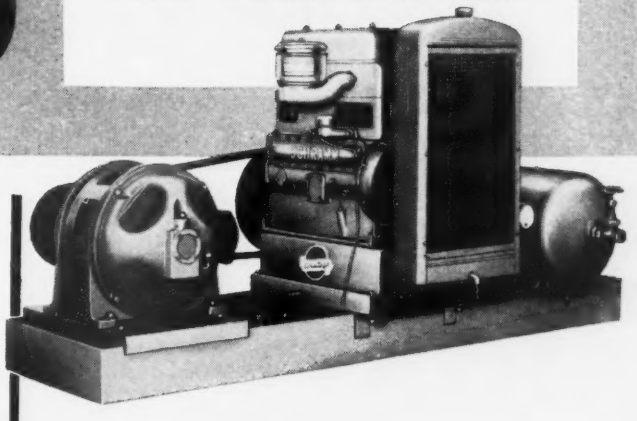

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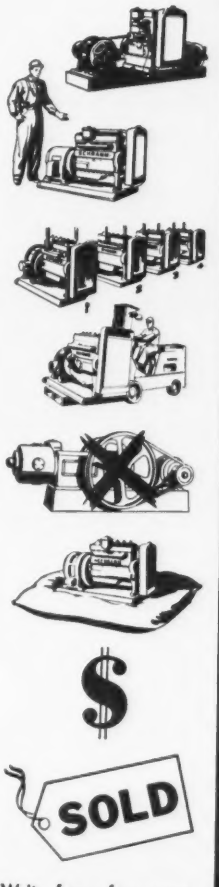

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cal to use that method of risering.

In places where it is readily available, natural gas is used in cutting torches, and in a few foundries liquefied petroleum (propane) gas is employed for the same purpose. In most plants, however, acetylene is preferred for torch cutting. Each gas requires a different type of nozzle, and a slightly different operating technique. The actual cutting is done, not by the gas flame itself but by the heat of combustion of metallic iron in the stream of oxygen. The well-known reaction, $2Fe + 3O = Fe_2O_3$ is so highly exothermic that it produces enough heat to melt away the steel rapidly.

The operation of torch cutting consists, therefore, of first heating a small spot on the surface of the casting with the gas flame, then shutting the gas almost off and feeding an increased amount of oxygen. As sand adhering to the casting prevents the steel from reacting readily with the oxygen stream, the place where the cut is to be made must be chipped or ground fairly clean. With the cutting torch alone, heads up to 18 or 20 in. thick are readily cut through. Generally a stub of from ¼ to as much as ¾ or 1 in. on very heavy pieces is left to be ground off.

Use the Oxygen Lance

Heavier cuts require the use of the "oxygen lance," which is simply a length of ⅛ or ¼-in. steel pipe, connected by flexible hose to the oxygen line. The cut is started by one man with a torch, and a second operator then points the lance into the cut and turns on the oxygen. The torch is sometimes entirely removed; sometimes a small flame is maintained to re-start the cutting if the lance encounters a spot sandy enough to interrupt the cut. There is almost no limit to the thickness of steel that can be cut with the lance.

In handling ordinary steel castings, especially small ones, the heads and gates can be cut off "in the green"—that is, before the castings have been annealed. No preheating is necessary for work of this class so long as the carbon content does not exceed some 0.35 to 0.40 per cent. Higher carbon steels, and those containing enough alloy to be deep air-hardening can not be handled safely until they have been given a preliminary anneal to reduce cooling stresses in them. Generally also they must be cut at a temperature of several hundred degrees Fahrenheit. After rough cleaning and blasting, castings of these steels should be given a preliminary annealing and removed from the furnace a few at a time while still at a temperature

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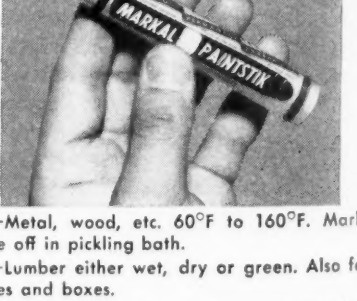

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which ranges between 500 and 600° F.

The heads and extra metal added as padding are then cut off with the torch as rapidly as possible, and the castings are returned to the furnace and allowed to cool slowly to nearly atmospheric temperature. Burning off heads and pads from hot castings is heavy work, and in some cases the men who do it must be paid extra. Experience has shown, however, that this is the only way to avoid the formation of burning cracks, which at the best result in greatly increased welding costs and at the worst make it necessary to scrap the piece.

Heavy fins may be cut away with the torch, but those of average thickness, as well as lumps, nail heads, sharp corners, brackets and cracking strips, usually are removed with air hammers and chisels. Very light castings that can be readily lifted are not usually chipped, but are dressed by hand on stand grinding wheels such as shown in Fig. 4. The stubs of small heads and gates may be chipped off, but larger ones are usually removed with stand or swing grinders, the latter being used for pieces too heavy to lift by hand or by small chain hoist.

Remove Grinder Dust

In many states, both stand and swing frame grinders must be provided with means to carry off the dust. A typical installation of swing frame grinders so equipped is shown in Fig. 5. Brackets and cracking strips that do not interfere with the proper functioning of the casting in service are often left in place. When it is necessary to remove them, light ones are chipped off. Heavy ones are nicked with air hammer and chisel at the point where they join the casting and are broken off with the sledge. They may, of course, be trimmed away with a cutting torch or with one of the recently developed arc-air or arc-oxygen devices.

External chills, if not "burned on" to the casting, are readily knocked off with sledges or pried away with air hammers and chisels. If the steel was poured extra hot, or the chills were too light, they will have melted partially on the sides exposed to the flowing metal, and will adhere tightly to the casting. In that case, it may be impossible to pry them loose with chisels. Then they must be melted off with the carbon arc, the gas torch or the arc-air device. The arc leaves a rough heavily scaled surface, and in some cases small cracks may be formed in the casting. If the foundry uses chills heavy enough to be really effective, it will not often be necessary to resort to burning, but in any foundry making big castings, it occasionally becomes a necessary job.

On the chipping floor an inspector looks over the castings and marks the defects that must be eliminated by welding. Sand or slag spots, hot tears, cracks, etc., are then either chipped out or removed with the carbon arc on the gouging torch. Flame gouging is usually cheaper than chipping and in the hands of a skilled man is probably the better method. Some foundries, however, have not adopted the gouging torch because it is so easy to remove metal with it that operators tend to cut away too much rather than too little metal.

High carbon steels and the air-hardening-low-alloy steels must be preheated before flame gouging to avoid the creation of new cracks or the enlargement of old ones. By noting when the chip in front of his chisel no longer has a crack in it, a skilled chipper knows when he has completely removed a crack or tear and is not tempted to take out any more metal after that point is reached, as the torch operator often does. In complicated castings, of course, many defects are so located

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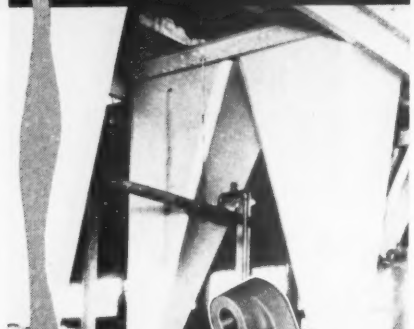

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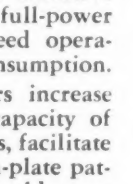

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that they cannot be reached with a chisel, and therefore must be cut out with the torch or the carbon arc.

Instead of the gas gouging torch, a graphite electrode similar to an electric light carbon may used. It should be inserted in the clamps used to hold metallic ones and an arc struck between it and the grounded casting. Alternating current welding circuits may be utilized for arc cutting, but the alternating current arc requires higher amperage for a given amount of heat than a direct current arc. Because more heat is developed at the positive than at the negative terminal of the arc, cutting should be done with straight polarity. Metal is readily melted away in this manner, and defective areas are removed much faster than by chipping. Like flame gouging, however, the method is open to the objection that it is so easy to remove metal that only highly skilled operators can be depended upon to stop when they have cut away all the defective metal. The arc tends to leave a heavily scaled surface, too, and in down-hand work the melted metal may accumulate in a pool over the spot being worked on. With the gas cutting torch, of course, the fused metal is readily blown away from the work as fast as it forms.

Blast Removes Melted Metal

To overcome these objections to carbon arc cutting, special clamps recently have been developed in which a blast of compressed air is projected along the electrode so that it impinges upon the spot under the arc and blows away the melted metal and scale as fast as they form. Oxygen may be substituted for compressed air. These devices, now on the market under two or more trade names, enable the operator to use the carbon arc very much as he would the gas cutting torch, without stopping at intervals to chip away the accumulated metal and scale. Defects so located as to be inaccessible to the chipping chisel thus can be cut out readily, and the surface of the cut does not require extra work to make it suitable for welding.

As will be described more fully elsewhere, many castings intended for very exacting service, especially those that must carry steam or liquids under pressure without developing leaks, are checked for cracks and tears by magnetic powder testing, as well as visually. As a rule, defects and possible defects indicated by this test are chipped out, rather than flame gouged, because the chipper can tell at the first cut whether he is dealing with an actual crack or merely a shallow wrinkle, and he takes off only enough metal to show which it is.

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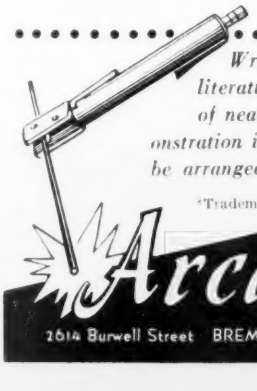

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For very exacting requirements, after a crack or tear has been chipped down to what the operator believes is sound metal, the cavity is ground smooth with a small wheel, and a further examination is made by the magnetic powder method.

In addition to examination by magnetic powder methods to locate defects at or close to the surface, many classes of castings are subjected to examination by radiography to disclose interior imperfections. When these are too serious, of course, the piece must be scrapped; otherwise the defective areas are cut away by flame or arc gouging, chipping or grinding until sound metal is reached. To ensure the removal of all imperfections, magnetic powder inspection or radiography is generally resorted to, and after the areas have been built up by welding, the piece may again be radiographed to insure that no unsound places remain and that the weld metal is homogeneous, sound and free from harmful inclusions or cracks.

(To be continued)

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How to Live Happily

"How To Get the Most Out of Every Day" is the title of a booklet recently published by the Bureau of Business Practice, a division of National Foremen's Institute Inc., 100 Garfield Ave., New London, Conn. It is an abridgement of a chapter from the book, *The New Way to Relax*, by Karin Roon, published by Greystone Publishers, New York.

The booklet suggests answers to the problems of organizing an individual's activities for highest efficiency and least amount of tension. Price is 20 cents a copy.

Book Review

The Cold Working of Non-Ferrous Metals and Alloys, cloth, 207 pages, 6 x 9 in., published by the Institute of Metals, 4 Grosvenor Gardens, London S.W.1, England. Price $2.50.

Contains five papers and discussion presented at the 1951 annual meeting of the institute which comprised a symposium on the metallurgical aspects of cold working metals. Phases considered include fundamental aspects, lubricants, cold rolling, wire drawing, and deep drawing and pressing.

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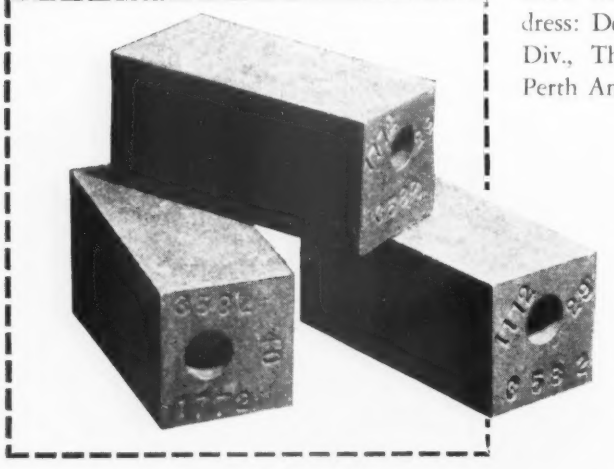

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Magnesium Castings

(*Continued from page* 99)

Alcoa made tests on alloy AZ92 by passing gaseous carbon dioxide, acetylene and natural gas through the melt. Although grain refinement was obtained with all of these gases, it was considered that CO_2 generated too much dross and oxide to be practical and that C_2H_2 and natural gas increased the hydrogen content of the melt to an undesirable degree.

It was found that these disadvantages can be largely overcome by the use of solid hydrocarbon compounds in which the number of carbon atoms is not less than the number of hydrogen atoms[9]. As further advantages, the solid material was easy to handle and to introduce to the melt. Naphthalene worked very well.

Table I shows the results achieved by treating the metal with naphthalene, a method used in limited production in Alcoa foundries for several months. Production experience showed, however, that castings grain refined with naphthalene had a higher incidence of leaks on pressure test than castings from superheated metal.

Porosity Caused by Hydrogen

The higher incidence of porosity in castings made from metal treated with naphthalene as compared to those made from superheated metal was believed to be caused by the absorption of hydrogen released when the hydrocarbon dissociated in the molten metal. An investigation was started to find substances that would minimize this difficulty. It was discovered that organic compounds containing halogen atoms were admirably adapted to this purpose, especially compounds of carbon and chlorine.[10] Tests made with carbon tetrachloride ($C Cl_4$), hexachloroethane (C_2Cl_6) and hexachlorobenzene (C_6Cl_6) gave excellent results.

Of these compounds, hexachlorobenzene was selected as the most suitable for production use. It was preferred over hexachloroethane because it contains more carbon per molecule and because its reaction time is shorter. This does not mean, however, that hexachloroethane is not a suitable material to use in the same manner as hexachlorobenzene.

The benefits obtained from the use of hexachlorobenzene are illustrated in the following controlled production test, in which 400-lb crucibles were used. Two production castings and one set (six) of test bars were poured from each 400-lb crucible of AZ92 alloy treated with hexachlorobenzene. The properties of the bars in the -T4 condition are shown in Table II.

The castings made were all pres-

sure tested, the results indicating that these castings were at least as sound as production castings made from superheated metal.

The results shown in Table II indicate a slight variation in the responses of different melts to grain refinement by carbon inoculation and a hint that an excess of carbon may be deleterious. Subsequent experience has shown, however, that there is no danger of overtreatment when hexachlorobenzene is used as a grain refining agent.

A rather complete series of tests was run on AZ92 alloy with both ingot and production metal charges in an effort to establish the minimum amount of hexachlorobenzene required to produce maximum grain refinement. In these tests, 60-lb melts were used. The results are given in Table III.

From the data in Table III, it can be seen that minimum grain size is reached when AZ92 melts of primary ingot are treated with 20 grams C_6Cl_6 per 100 lb of metal and that there is no significant change when the amount of hexachlorobenzene is increased to 33 grams per 100 lb of metal treated. Table III also shows that melts which contain appreciable amounts of metal previously treated with hexachlorobenzene retain their fine grain without further treatment but that additional treatments of up to 40 grams of hexachlorobenzene per 100 lb of metal are not harmful. The few tests on melts consisting wholly of secondary ingot indicate that this type of metal behaves similarly to primary ingot in its response to grain refinement by carbon inoculation.

Minimum Amount Required

Tests were made on AZ63 to determine the minimum amount of C_6Cl_6 required to refine the grain of this alloy. For these tests 60-lb heats of primary AZ63 ingot were used, with results shown in Table IV.

Here again, the addition of 20 grams of hexachlorobenzene per 100 lb of metal results in maximum properties (and, presumably, minimum grain size), and additional amounts of up to 40 grams per 100 lb of metal are not harmful.

Subsequent production experience has shown that hexachlorobenzene in amounts of 20 grams or more per 100 lb of metal treated is an effective and consistent grain refining agent for AZ92, AZ63, AM100 and AZ91C. This is true for either sand or permanent mold castings. Furthermore, its use has eliminated the recurrent "epidemics" of coarse grain which caused great loss in the foundries when superheating was the grain re-

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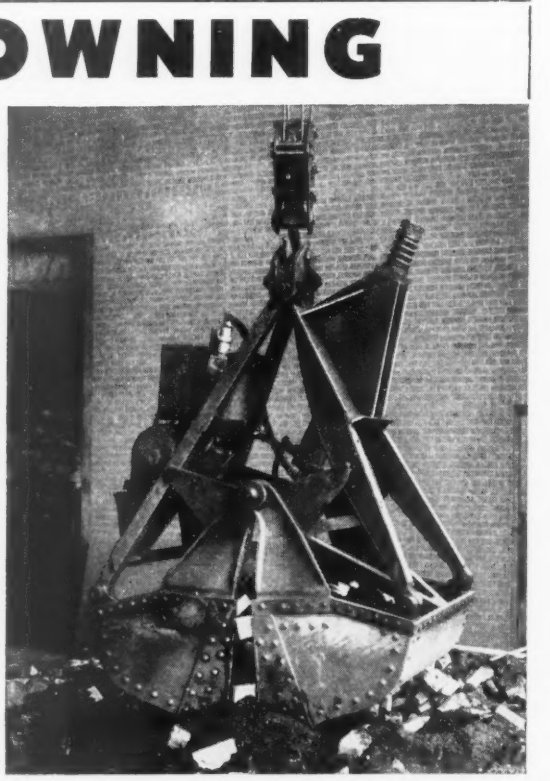

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fining method formerly employed

Resistance to Corrosion — An important question which had to be answered prior to the adoption of C_6Cl_6 as a material for refining the grain of magnesium foundry alloys concerned what effect treatment with C_6Cl_6 had on resistance to corrosion. Salt spray and alternate immersion corrosion tests were therefore conducted on batches of metal, one portion of which was cast into test bars after superheating and another cast into bars after the metal had been treated with C_6Cl_6. Primary metal was used for the test to eliminate as many variables as possible. In all melts the nickel content was less than 0.004 per cent, the copper content 0.025 per cent or less, and the silicon content 0.10 per cent or less. Prior to exposure in 3½ per cent salt spray or to alternate immersion in 3 per cent salt solution, the test bars were dipped in hydrofluoric acid to eliminate surface iron and silica and then chrome pickled. The results of the corrosion test are given in Table VI.

A study of the data in Table VI will show that hexachlorobenzene has only an indirect effect on resistance to corrosion. Treatment of the melt with C_6Cl_6 does not adversely affect resistance to corrosion, and its use tends to improve resistance to corrosion by eliminating the need for heating the metal to high temperatures in contact with iron. Superheating brings about an increase in iron content which adversely affects resistance to corrosion. Data in Table V indicates that loss in tensile strength and elongation caused by alternate immersion in salt solution varies directly with iron content for all alloys tested.

There is no evidence that use of C_6Cl_6 removes iron from magnesium alloys, but continued use of C_6Cl_6 lowers the iron content of metal in the system. This effect is more noticeable in permanent mold foundries where pouring temperatures are lower than in sand foundries.

Melting Room Procedure — Hexachlorobenzene (C_6Cl_6) can be obtained from several sources in powder form. It melts at about 441° F and boils at 619° F under standard conditions. It is a relatively inert material and does not appear to be hygroscopic. Although C_6Cl_6 is said to be nontoxic, it is advisable to provide respirators for personnel handling the material in powder form.

The powder is easily briquetted, and it is in the form of briquets that C_6Cl_6 is most easily handled and used in the melting room. It also can be used, particularly in small crucibles

up to 150 lb capacity, as a package of the powder in aluminum foil. It is convenient to bind the package or the briquet in soft iron wire as shown in Fig. 2.

It is important that the grain refining agent be submerged deep enough in the molten metal to prevent unreacted hexachlorobenzene from escaping, but still not so deep as to contact the flux heel which may be in the crucible. These two objectives are easily accomplished by tying the C_6Cl_6 briquet or package to a loop in a heavy wire as shown in Fig. 1. The lower leg of this heavy wire or light rod is usually 6 to 8 in. long and the upper leg long enough to hook over the crucible edge.

In use, this length of heavy steel wire or light rod bearing the C_6Cl_6 package or briquette at the loop is simply plunged quickly into the metal. The reaction is usually completed in 30 seconds and, when it is done properly, little or no gas is evolved. The reaction is frequently accompanied by vibration of the crucible, but the metal surface is not disturbed.

Temperature Is Important

The temperature at which the C_6Cl_6 is added to the molten metal is fairly important. Satisfactory results can be obtained in the range 1400° F to 1500° F. Below 1400° F, the reaction is slow, and some C_6Cl_6 may be lost by breaking from the briquet and burning at the surface of the metal. Above about 1520° F the reaction may be so rapid as to cause the crucible to rise an inch or two out of its setting. Although this disturbs the melting room personnel the first few times it happens, no metal has been thrown from the crucible in these instances.

The recommended temperature at which to add C_6Cl_6 to molten metal is 1450°-1500° F for either sand or permanent mold operations. If necessary for production considerations, the temperature of addition in the melting room of the permanent mold foundry can be 1400° F.

This is a typical sequence of melting room operations:

1. Melt down in the usual manner in the crucible or fill the crucible from the pre-melt furnace.
2. Heat metal to 1320°-1350° F and flux refine or chlorinate as desired.
3. Heat metal to 1450°-1500° F and add 20-25 grams of hexachlorobenzene per 100 pounds of metal by plunging wire or rod bearing C_6Cl_6 briquet or package under surface. Cover broken surface with flux.
4. Heat or cool to pouring temperature and pour.

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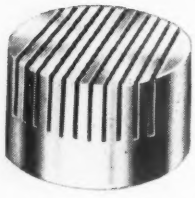

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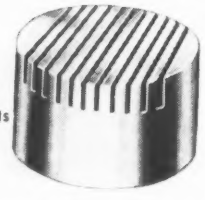

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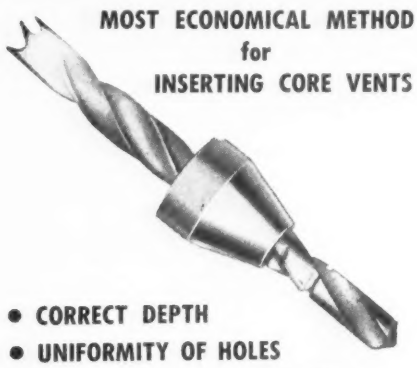

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After hexachlorobenzene has been used in the foundry for several weeks, it is unquestionably true that melts consisting largely of remelt (foundry scrap) would not need to be treated with any or, at least, as much C_6Cl_6 as recommended above. However, the cost of the C_6Cl_6 addition is so small that savings in this direction are hardly worth the effort of keeping track of melts with charge components which would allow a reduction of the amount of C_6Cl_6 needed to maintain fine grain.

Advantages of This Method—The metallurgical and operating advantages of an effective and consistent method of obtaining fine grain in magnesium alloys will be obvious to all persons engaged in the founding of these alloys in either sand or permanent molds. The more obvious advantages include these:

1. Practically complete elimination of low-property melts—that is, melts rejected because test bars failed to meet specifications.

2. Reduction in foundry scrap caused by cracks. This is most evident in permanent mold work.

3. More consistent results from a given solution heat treatment. This can be reflected in a generally higher level of properties in castings and test bars or a shorter heat treat cycle for the same level of properties.

4. Increased furnace room capacity because time consumed in the superheating operation and subsequent cooling to pouring temperature is eliminated. In the permanent mold foundry, this can result in a 100 per cent increase in melting and holding capacity with the same number of furnaces. In the sand foundry an increase of at least 25 per cent in melting capacity is indicated.

5. Improved working conditions in the melting room.

In regard to the first item in the list, a study of the production test bar records in one of the Alcoa magnesium sand foundries revealed that 6.6 per cent of the AZ92-T6 bars tested failed to meet the minimum tensile strength requirement of 34,000 psi when grain refinement was accomplished by superheating. When C_6Cl_6 was used as a grain refining agent, this foundry operated for an entire year without a single AZ92-T6 bar failing to have a tensile strength in excess of 34,000 psi. For AZ63-T6 the production test bar summaries show 1.1 per cent of the tests were under 34,000 psi tensile strength during the use of superheating and 0.17 per cent when C_6Cl_6 was used as the grain refining agent. The way C_6Cl_6 raised the general level of tensile strength of production test bars is

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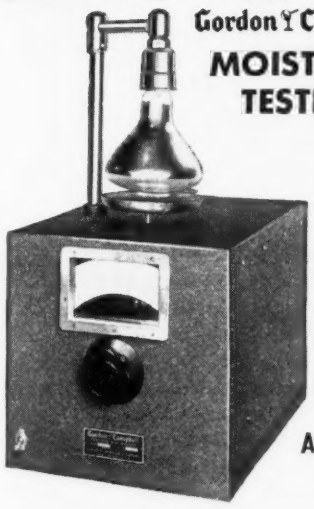

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indicated by the fact that when C_6Cl_6 was used, 44.1 per cent of the AZ92-T6 bars had a tensile strength of 40,000 psi or higher, compared to 22.0 per cent during superheating. For AZ63-T6, comparable figures are 20.2 per cent with C_6Cl_6 and 14.7 per cent with superheating.

The listed advantages of using C_6Cl_6 for grain refinement are real and they result in reduced foundry costs, even though it is difficult to name an exact amount in dollars. With respect to such items as flux consumption, crucibles and fuel, however, definite dollar savings are possible.

Because of constantly changing prices, it is deemed advisable to show the saving that can be effected by substituting C_6Cl_6 for superheating as a grain refining method in terms of percentages rather than dollars. The figures given in Table V are the result of a six-months' survey of a sand foundry melting about 600,000 lb of metal per month.

It is thus apparent that demonstrable cost reduction can be obtained by changing to C_6Cl_6 as a means of refining the grain of magnesium alloys. Actually, the savings are considerably greater than indicated in Table V because of the intangibles previously mentioned. Offsetting the savings, of course, is the cost of the hexachlorobenzene and its preparation for use. Alcoa's experience has been that this cost is well under 10 per cent of the savings effected. If oil firing is used, the savings from the use of C_6Cl_6 instead of superheating are increased. The company's experience is that with oil firing, the crucible consumption during superheating to 1750° F is one-third greater than when gas is used. Since 1944, approximately 75 million lb of magnesium alloys have been successfully treated with hexachlorobenzene in the foundries of Aluminum Co. of America.

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Die Casting Problems

(Continued from page 91)

mechanism, blocking of the water-cooling system, mounting inserts, hanging castings due to nicks and bruises or roughened patches on cavity surfaces all can be responsible. The die should receive regular inspection for the onset of any of these features and should be given the necessary corrective treatment.

Faulty ejection is one of the prime single causes of variations in die temperature and deviations in casting sizes. It may arise because of poor disposition of push rods relative to the casting, causing the latter to be forced awry in the cavity instead of being smoothly pressed out. This condition in turn will give rise to distortion, bending or cracking of thin walls of the casting.

Excessive ejection pressure may involve cutting into walls of casting by rods. On the other hand, ejection may occur before the casting has solidified sufficiently. Ejection may be retarded by lack of draft on cavity walls or cores. Each of these possible troubles should be investigated in turn if analysis of preceding possibilities fails to eliminate inaccuracies.

2. Excessively high fluctuation of alloy temperatures should be eliminated. If this factor is the suspected cause of errors, a series of short trial runs should be made with the die, with alloy heat controlled at various levels. The respective batches of castings, cooled to room temperature, should be measured to determine which temperature gives closest adherence to stipulated dimensional tolerances. The heat controlling mechanism of the machine should then be set at that value.

3. With castings substantially cored, the occurrence of considerable delay before their ejection may lead to seriously unequalized shrinkage, the outcome of which will be variations in finished sizes. Distortion of the part also may develop still farther and aggravate the lack of precision. Before production use of the die is begun, the interval required before ejection should be determined accurately during the proving tests, and the machine's timing mechanism covering actuation of the movable platen should be set to give such a time-lag after each injection shot.

4. Unequalized shrinkage may take place because of many factors, some of which have already been noted in respect to difficulties mentioned earlier. The most common is the presence of bosses, ribs, cores or similar projections in the die cavity

With certain types of castings, however, the introduction of bosses or ribs at selected points may retard excessive contraction in one direction and simplify core extraction and ejection. These features should be considered carefully.

5. Distortion of a casting generally arises from faulty core manipulation, poor ejection, wrong location of ejector push rods, grossly unequalized shrinkage or unsatisfactory gating. Where dimensional errors due to distortion are suspected, all of the above features should be checked systematically and corrected as required.

Distortion sometimes occurs because of sticking castings in the die cavity. This problem may arise because of minute nicks, bruises or scratches caused during working or from undercuts at wall junctions inadvertently formed during initial machining stages. Such undesirable features should be noted by regular inspection of the die, and corrected by repolishing the matrix surfaces. Die faults of this character will usually be self-evident to the observant die operator, though occasionally they may be difficult to detect.

(To be concluded next month)

Battelle Establishes New Swiss, German Centers

Battelle Memorial Institute, Columbus O., has established research centers and fellowship centers at Frankfurt, Germany, and Geneva, Switzerland. Designed to advance the economic betterment of European economy through industrial research and the general advance of science and technology on both sides of the Atlantic, the new research centers and fellowship programs are the first of a number contemplated for western European countries in the future.

Estimated cost of the Frankfurt chemical, metallurgical and engineering research center is $1 million for construction, on a site presented by the city, and $500,000 for equipment. The plant should be ready for occupancy by late spring of 1953. The Geneva laboratory will be a remodeled medical research center and should be ready early in 1953.

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NICKEL ALLOYS: International Nickel Co., 67 Wall St., New York 5—Three booklets offer lists of publications pertaining to metals. List *A* covers those meant for production men, design engineers, metallurgists and metal users. List *B* is a complete tabulation of available literature on the company's nickel alloys. Third list describes 15 publications concerning ductile iron.
For More Details Circle No. 91—Page 231

HEAD PULLEYS: Iowa Mfg. Co., Cedar Rapids, Iowa—Bulletin MP-1 illustrates various types of motorized head pulleys and describes their nature, performances and applications. The manufacturer states that they simplify belt or belt-bucket elevator installations. Specifications and a data sheet which can be filled out and mailed to the company for suggestions are included.
For More Details Circle No. 92—Page 231

DUST CONTROL: American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka, Ind.—Brochure dealing with dust and fume control in a multitude of process industries tells how clothtube-type dust collectors are used to handle complex problems in 33 typical installations. Primary and secondary smelting are two of the metal processing industries considered.
For More Details Circle No. 93—Page 231

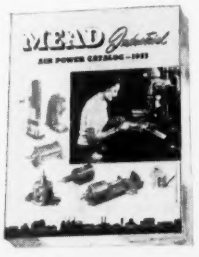
WIRE ROPES: A. Leschen & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12—Handbook R-51 contains descriptions, diagrams and illustrations of wire rope types and constructions, as well as material about lubricants, working loads, safety factors and specifications. Forty separate charts give breaking strengths and weights of wire ropes by constructions and sizes.
For More Details Circle No. 94—Page 231

CORE BAKING: Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N. Y.—Bulletins IGS-M900A, IGS-M1800A and IGS-300T contain specifications for two foundry core baking tunnels and for a core baking turntable, all operated electronically. Core bakers are now available with hourly capacities of from 500 to 8000 lb. Specifications sheets are illustrated and complete.
For More Details Circle No. 95—Page 231

CUPOLA PRACTICE: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Bulletin FO-7 describes methods for maintaining quality and economy in cupola melting. It contains data for air blast control and humidity compensation prepared by Battelle Memorial Institute, including charts for determining rapidly the relationship between humidity, blast rate and coke weight. Also included are illustrations of equipment used to control volume of air by weight and by moisture content automatically.
For More Details Circle No. 96—Page 231

INDUSTRIAL MAINTENANCE: Wheeler Associates Inc., 15017 Detroit Ave., Cleveland 7—Booklet details such topics as keeping equipment, methods and facilities in top operating condition; organizing an industrial maintenance program and other important points. The literature covers lighting, air conditioning, color painting, noise conditioning, vibration control, plant architecture and good housekeeping.
For More Details Circle No. 97—Page 231

AIR POWER MACHINERY: Mead Specialties Co., Dept. P-8, 4114 North Knox Ave., Chicago 41—The two - color, 56-page 1953 edition of the company's air power catalog is ready for distribution. It pictures and describes the firm's entire line of single and double-acting air cylinders and air-operated presses, vises, chucks, valves, hammers and work feeders.



For More Details Circle No. 98—Page 231

LIFTING MAGNETS: Dings Magnetic Separator Co., 4740 West Electric Ave., Milwaukee 46—Catalog B-1401-A contains data about capacities, ratings, dimensions and special features of the company's welded lifting magnets. Publication is illustrated and includes a large drawing of a magnet in cross section showing salient points about its construction.
For More Details Circle No. 99—Page 231

MACHINERY DIRECTORY — Link-Belt Co., 307 North Michigan Ave., Chicago 1—Book 2453 contains 48 pages illustrating the scope of the company, the products it makes, the industries it serves, the literature it has available concerning specific products and information about its manufacturing plants, offices, distributors and repersentatives.
For More Details Circle No. 100—Page 231

ELECTRIC HEATERS: Edwin L. Wiegand Co., 7596 Thomas Blvd., Pittsburgh 8—Catalog D-52 lists 75 different models of forced air, convection and radiant heaters in capacities of from ¼ to 100 kw for heat-

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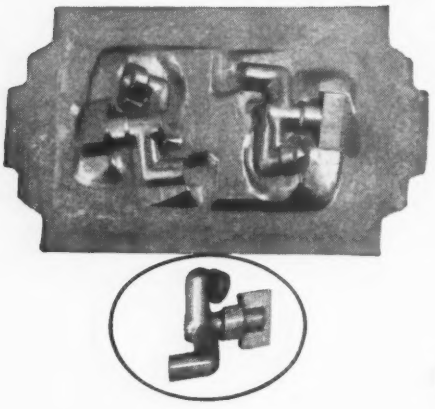

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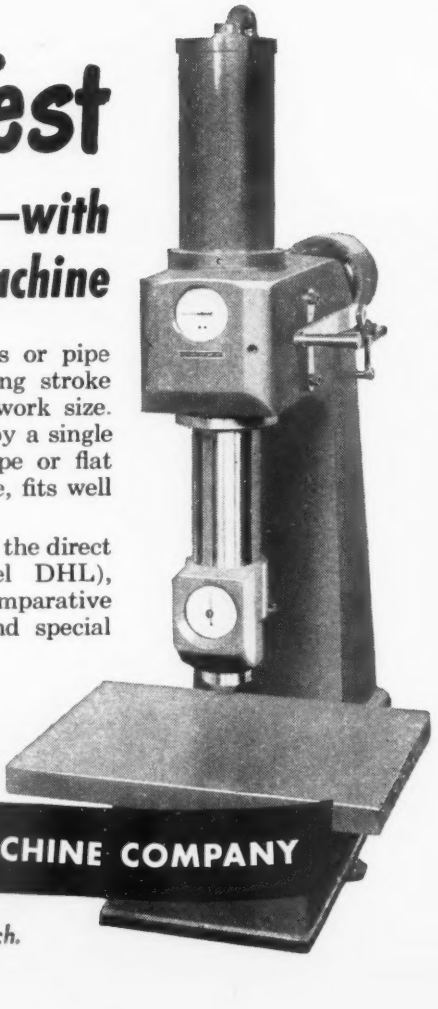

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(*Continued from page 264*)

ing anything from a small office to a complete building and for keeping men warm in open or semiexposed areas. A quick selector chart shows how to calculate heat requirements for given areas and types of building construction.
For More Details Circle No. 101—Page 231

ELECTRIC FURNACE: Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich.—Bulletin 528 describes the firm's new electric furnace designed for investment casting precision parts weighing up to 10 lb. The publication includes illustrations, specifications and basic data.
For More Details Circle No. 102—Page 231

SPRAY PAINTING: Ransburg Electro-Coating Corp., 1234 Barth Avenue, Indianapolis 7—Booklet describes the company's No. 2 electrostatic spray process, in which conventional automatic spray guns are used, and claims an efficiency in most cases in the high nineties.
For More Details Circle No. 103—Page 231

BOX MUFFLE FURNACES: Burrell Corp., 2223 Fifth Ave., Pittsburgh 19—Bulletin 315 describes new life of laboratory furnaces for low and high temperature testing operations. Five different models are described in terms of temperature ranges, features, dimensions, prices and other data.
For More Details Circle No. 104—Page 231

IMPREGNATING CASTINGS: American Metaseal Corp., 607 65th St., West New York, N. J.—Folders explain how impregnating material seals casting porosity permanently, resists temperatures from −70°F to 400°F and can be machined. Machine to apply impregnating material is described, too.
For More Details Circle No. 105—Page 231

REVERBERATORY FURNACE: Eclipse Fuel Engineering Co., Rockford, Ill.—Catalog C-90 describes functions and operation of reverberatory furnace for melting iron, brass, aluminum and other metals. Table of dimensions is included. Furnace is manually or mechanically charged, gas or oil fired.
For More Details Circle No. 106—Page 231

HANDLING EQUIPMENT: Lewis-Shepard Products, Watertown, Mass.—All-products folder describes basic units in the company's line of materials handling equipment — electric fork trucks, stackers, hoisters, working height lifters, skid platforms, storage racks, hydraulic and mechanical trucks and floor trucks.
For More Details Circle No. 107—Page 231

FILES: DoAll Co., 254 North Laurel Ave., Des Plaines, Ill.—Bulletin 51-801 presents fully illustrated data concerning the manufacturer's industrial files and gives information regarding the use and application of each particular type. A table of

sizes and dimensions is included. Such types of files as pitsaw, tapered, pillar and warding are covered.

For More Details Circle No. 108—Page 231

ROTARY TOOLS: M. A. Ford Mfg. Co., Davenport, Iowa—New and complete catalog illustrates and gives specifications for 363 shapes and sizes of high - speed steel rotary files, ground cutters, countersinks, rasps, carbide cutters, end mills and grinding burs. A "grade of cut" chart and a chart showing recommended operating speeds for both rotary files and ground cutters are included.

For More Details Circle No. 109—Page 231

MARKING TOOLS: M. E. Cunningham Co., 1030 Chateau St., Pittsburgh 33—Catalog 100 describes and illustrates over 100 different marking tools and devices manufactured by the company. Information is included concerning a specially developed alloy said to reduce spalling and mushrooming and increase marking life.

For More Details Circle No. 110—Page 231

CORE CONTROL: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Volume 3, No. 3 of the firm's publication, *Foundryman's News Letter* is devoted to cores and castings, particularly to high-temperature core control, and also contains information about the organization's new tools for control of sands.

For More Details Circle No. 111—Page 231

SILICONE INSULATION: Dow Corning Corp., Midland, Mich. — Booklet condenses reports the company has received on operating conditions and performances of equipment insulated with its Class H silicone electrical insulation. These reports cover a variety of situations and installations.

For More Details Circle No. 112—Page 231

SHELL MOLD MACHINE: Shell-O-Matic Corp., Division of Newark Pattern Works, 26-32 Avenue L, Newark 5, N. J.—Bulletin describes features of the firm's semiautomatic shell molding machine and explains its operating cycle. Machine occupies 18 sq ft of space and produces one shell mold per minute.

For More Details Circle No. 113—Page 231

METAL CLEANING: E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33—Leaflet describes industrial metal cleaning with the aid of "cold cleaners" recently developed by the manufacturer. These cleaners are used at room temperature in power washers to remove heavy drawing oils, pigmented drawing compounds, sulphurized cutting oils, rust preventives and

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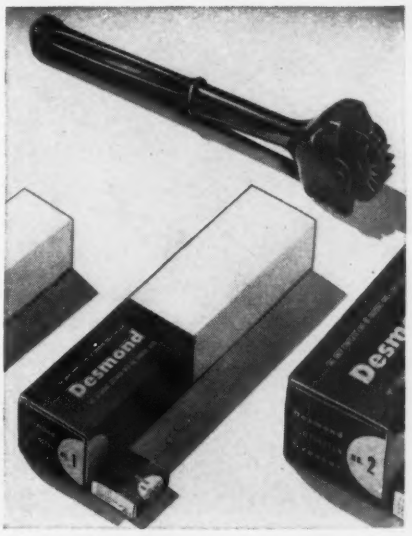

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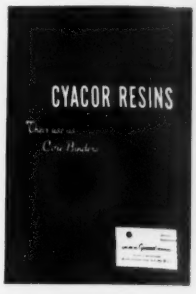
For More Details Circle No. 114—Page 231

CORE BINDERS: American Cyanamid Co., 30 Rockefeller Plaza, New York 20 — Booklet describes the properties of resins for use as core binders and discusses formulations, mixing procedure, baking procedure and storage. Resins are available in two types, one a stable, dry powdered urea-formaldehyde resin, particularly effective for dry sands, the other a low viscosity urea-formaldehyde solution for use with both wet and dry sands.



For More Details Circle No. 115—Page 231

GREEN SAND ADDITIVE: Hercules Powder Co., Naval Stores Dept., 920 King St., Wilmington 99, Del.—Booklet describes applications and effects of the company's green sand additive. Tables and charts containing laboratory test data are included to substantiate the textual material.
For More Details Circle No. 116—Page 231

DIE CASTING MACHINE: A. B. C. Die Casting Machine Co., 339 West 112th Place, Chicago 28—Folder describes die casting machine for small work which offers automatic cycling and produces up to 1000 one-lb shots per hour. A table of specifications is included.
For More Details Circle No. 117—Page 231

DIE CASTING MACHINES: Cast-Master Inc., 2123 Hamilton Ave., Cleveland 14—Catalog offers illustrations and specifications for the firm's latest die casting machines for the production of small, medium, large and outsize castings.
For More Details Circle No. 118—Page 231

AIR CYLINDERS: Lindberg Engineering Co., 2453 West Hubbard St., Chicago 12—Bulletin 731 describes the firm's complete line of air cylinders. Diagrams, charts and photographs explain capacities, types of mountings and other matters.
For More Details Circle No. 119—Page 231

HOOK-ON INSTRUMENTS: General Electric Co., Schenectady 5, N. Y.—Bulletin GEC-901 includes information about applications, operation and basic features of the firm's complete line of hook-on instruments, such as volt-ammeters, wattmeters and power factor meters.
For More Details Circle No. 120—Page 231

TORCHES: Arcair Co., 2614 Burwell St., Bremerton, Wash.—Brochure describes how metals can be cut or gouged by a torch which uses only carbon arc and compressed air. Pictures and text cover applications and operating instructions.
For More Details Circle No. 121—Page 231

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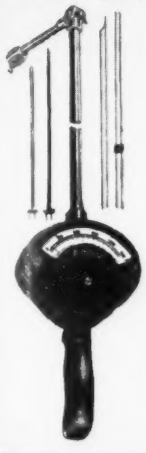

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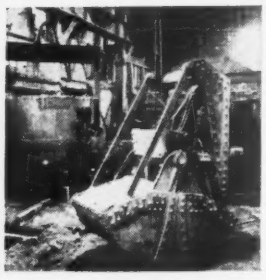

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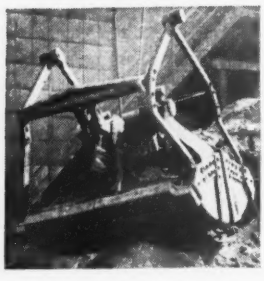

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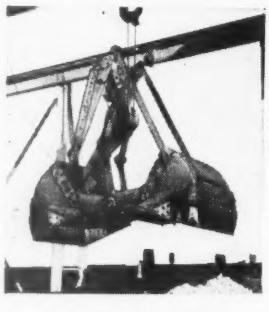
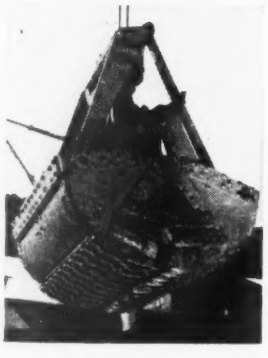
Blaw-Knox Shark Tooth Buckets are available in a wide range of sizes and for different headroom conditions.





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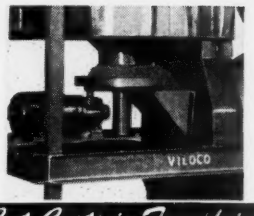

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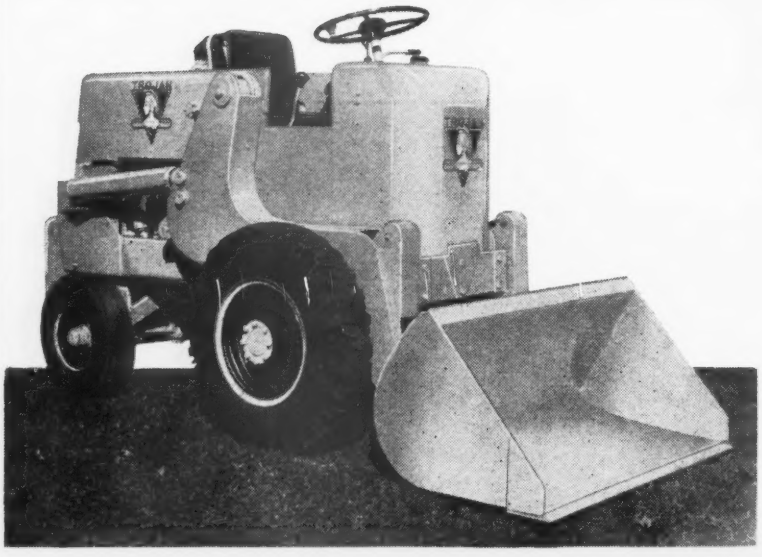

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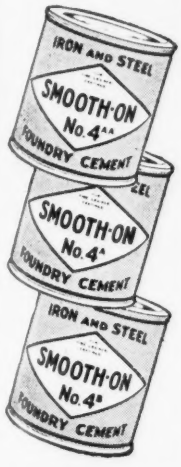

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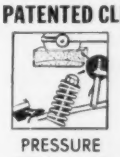

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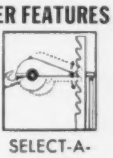

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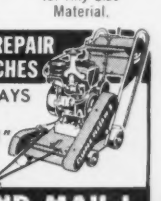

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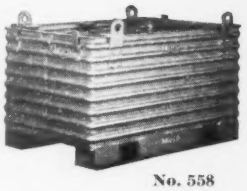

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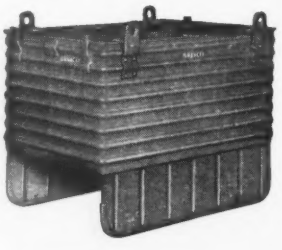

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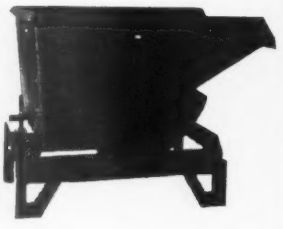

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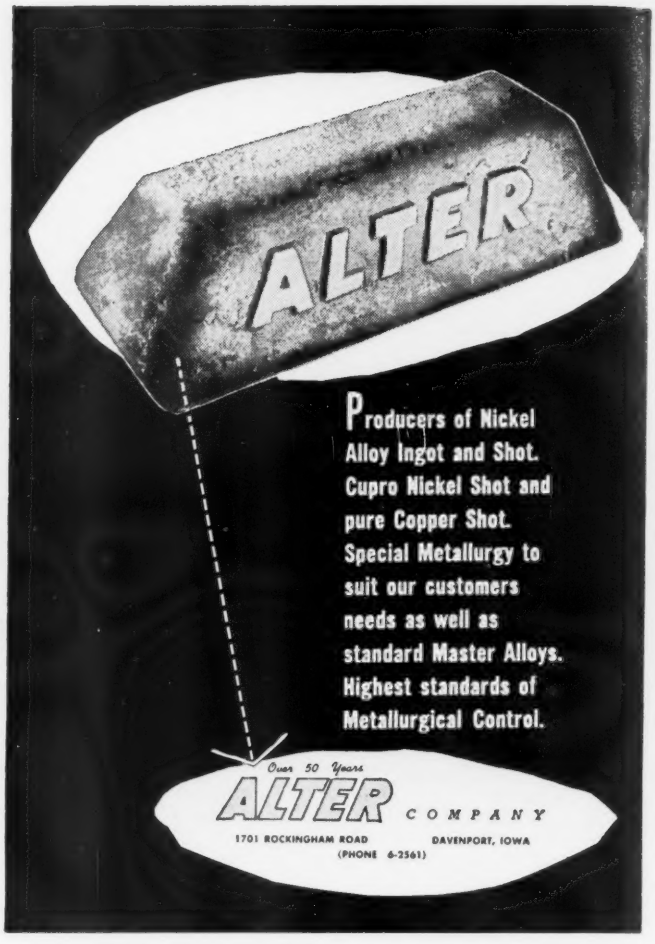

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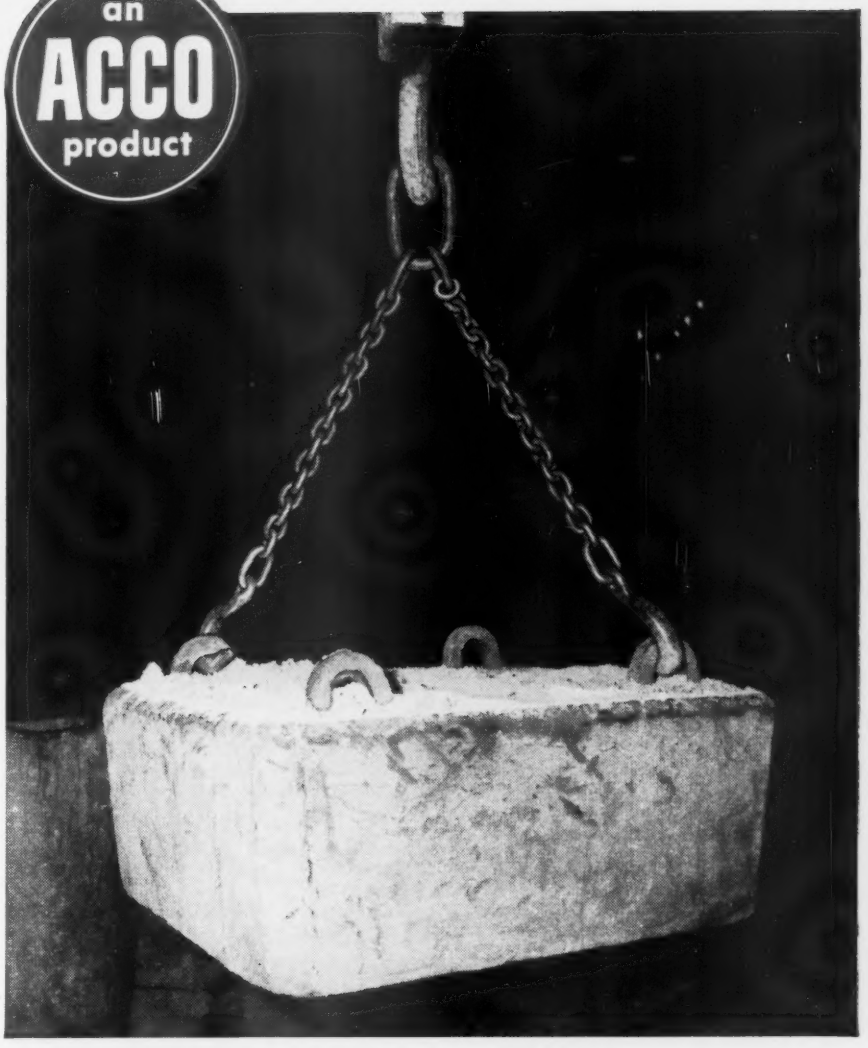

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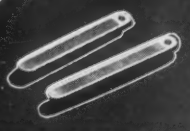

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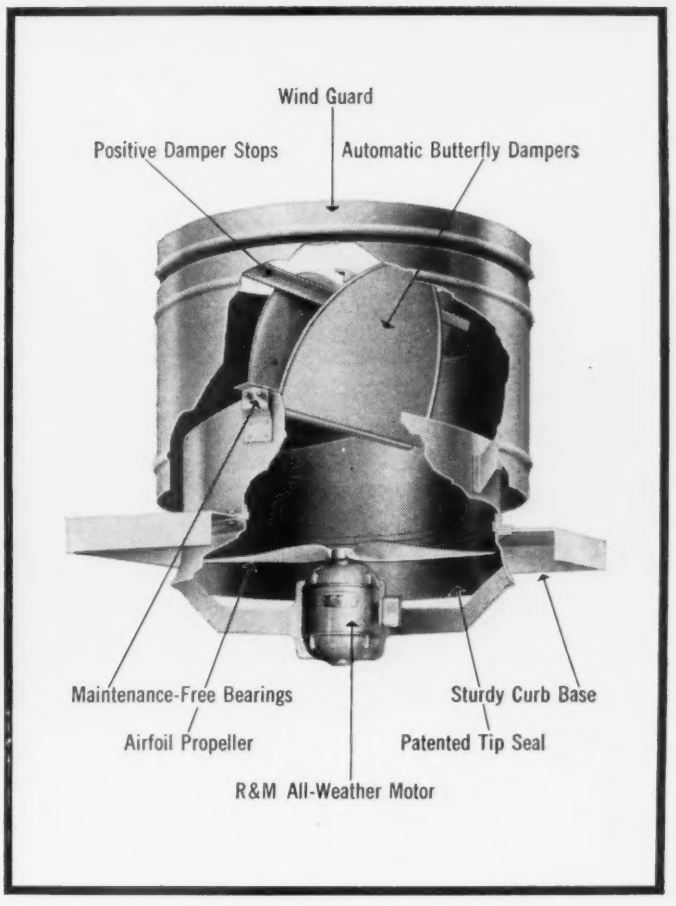

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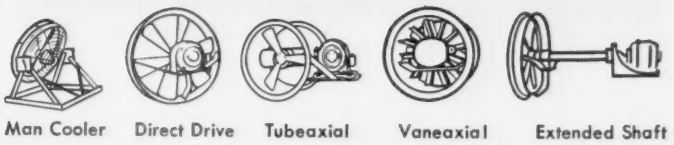

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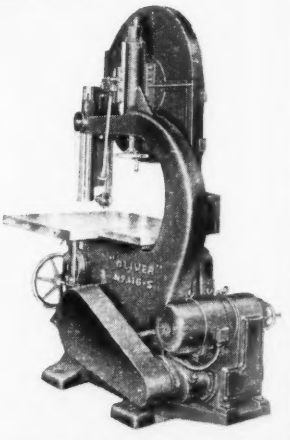

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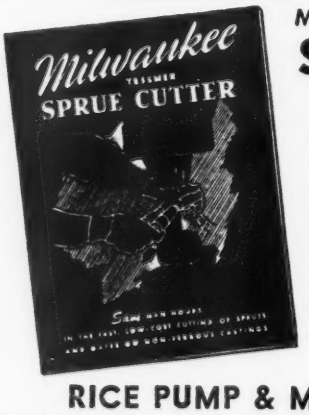

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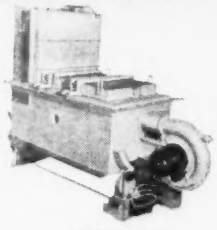

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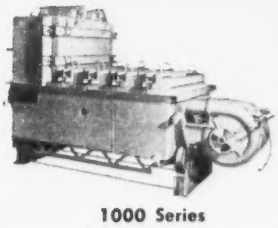

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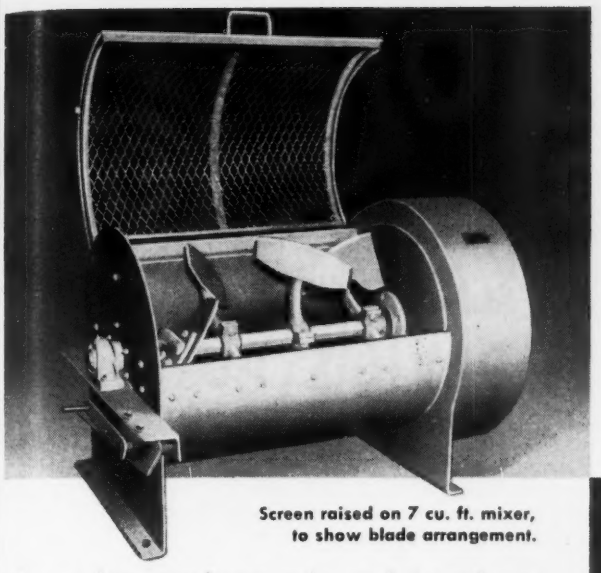

Screen raised on 7 cu. ft. mixer, to show blade arrangement.

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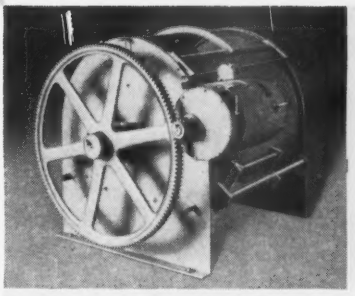

Rear view of 7 cu. ft. mixer, with gear guard removed, showing direct drive motor. Anti-friction bearings throughout. Quick acting discharge door is operated from the front of the mixer. Mixers are shipped complete, ready to install and operate.

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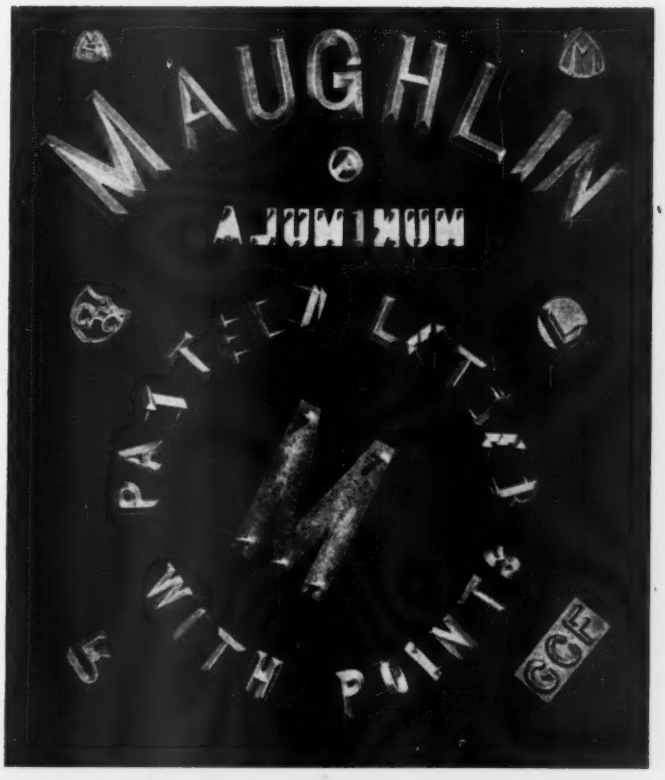

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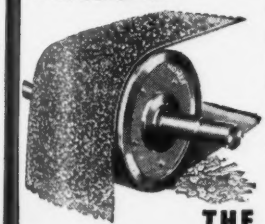
. . . CAN BE USED INSIDE or OUTSIDE PLANT . . .



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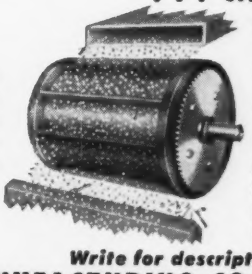

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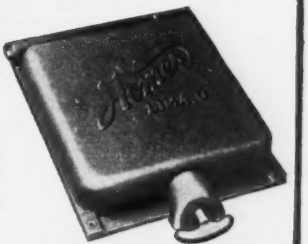

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Very small nonferrous foundry needs intelligent, skillful, aggressive working bench molder foreman. Experience or interest in French Sand or very fine quality castings important. Opportunity to own interest in foundry. Church goods, tablets, crematory urns, hardware, etc. is our line. Room to take on other customers. Now doing some outside work. Nicely equipped, excellent housing available. Location: Southern Connecticut. Address: Box 492, FOUNDRY, Cleveland 13, Ohio

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Experienced brass and bronze molder wanted. Under 40 years of age, to learn our business and eventually take charge. Send complete resume of background and experience, and include salary desired. Interviews will be arranged promptly for qualified applicants. Address: Box 495, FOUNDRY, Cleveland 13, Ohio.

METALLURGISTS

Two recently graduated metallurgists. One to handle cupola operation problems and assist melting foreman. One to work on new methods of operation and metallurgical problems in modern progresssive malleable iron foundry in Northeastern Ohio. State experience, references, salary.

BOX 473
FOUNDRY CLEVELAND 13, OHIO

SALESMEN

Excellent future offered in selling shell molding resins in two midwest territories for men with right qualifications—experienced in self management and foundry sales, a leaning toward technical problems and some knowledge of gating, core and molding practice. Compensation includes car, salary, expenses and incentive. Write giving full details. Address: BOX 448, FOUNDRY, Cleveland 13, Ohio.

AN IDEA . . . FOR THE RETIRED FOUNDRYMAN

FOUNDRY magazine has assignments which might interest retired foundrymen. We are looking for responsible individuals to make personal calls on foundries for us, checking on service to readers and selling subscriptions to key personnel. Arrangements will be made for part or full time work, extended or limited travel to suit individual cases. Salary and bonus with expenses paid. **WRITE TO: FOUNDRY, BUSINESS MANAGER, 1213 W. 3RD, CLEVELAND 13, OHIO.**

FOUNDRY SUPERINTENDENT
($8,000—$10,000)

Multi-plant organization requires man with ten years' experience in gray iron foundry operations, preferably with metallurgical degree. Must be well versed in all modern methods of foundry operations, cupola practice, sand slingers and sand control. Expanding industry with liberal retirement, hospitalization and insurance programs. Send resume. Address: BOX 484, FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Experienced on mechanized operation to supervise new rollover and strip mechanized line in established Eastern foundry. State age, experience and salary requirements. Address: Box 450, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Malleable iron, New England. Must be able to organize and operate lab. Two analyses per day. Assistant later if required. Right man will ultimately be in charge of quality of product from melting through annealing. Small foundry. Address: Box 454, FOUNDRY, Cleveland 13, Ohio.

FIELD SERVICE MEN

Excellent opportunity for men to demonstrate correct use of synthetic resin core binders in midwest. Car, salary, bonus and expense account. Provide full details and references. Address: Box 451, FOUNDRY, Cleveland 13, Ohio.

PRESSURE CAST MATCH PLATE MOLDER

Old established foundry in Eastern Pennsylvania seeks man thoroughly acquainted with practical end of pressure cast matchplate production. Bonus for production on top of salary. Must be ready to start work March 1st. Good opportunity for right man. Write, giving past experience in detail. Address: Box 488, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

BRASS FOUNDRY FOREMAN

For modern production shop. Must be acquainted with squeezer matchplate work. Good fishing and hunting in this section of Michigan. State experience and references in first letter. Address: Box 445, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

To take charge of a large aluminum sand foundry producing commercial castings and intricate castings for defense. The position consists of planning production methods and the rigging of all patterns for maximum production. The man employed will be responsible for getting out production, and therefore, must have the ability to get along with people. The position may be filled by a man with no aluminum foundry experience if he is the man who can produce castings efficiently. Address: Box 506, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SALES ENGINEER

Foundryman or metallurgist to demonstrate and sell foundry chemicals. Must be able to diagnose foundry problems. Age 21 to 35 preferred. Several territories open. Address: Box 514, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Progressive mechanized midwest foundry has opening for an aggressive, experienced, gray iron salesman. Salary plus expenses plus bonus. Preferably 30 to 45 years. All replies confidential. Address: Box 489, FOUNDRY, Cleveland 13, Ohio.

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SALES AND SERVICE

Nationally known producer of foundry coke desires metallurgist with melting experience for sales and cupola service over large territory. Give experience, education, age and salary expected. Replies treated confidentially. Address: Box 518, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

For modern production shop, must be acquainted with high frequency core baking or dielectric core baking. Address: Box 498, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMEN

Actual molding experience and a thorough knowledge of bronze and aluminum castings, melting, molding, and pouring, etc. Knowledge of ornamental bronze tablets desired. Western Pennsylvania area. Age thirty to forty.

BOX 486
FOUNDRY CLEVELAND 13, OHIO

WANTED

Superintendent with complete knowledge and wide experience in gray iron foundry practice; to take charge of a new foundry in Mexico City.

BOX 521
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For steel foundry in New Jersey. Must have actual experience in molding and be able to instruct molders. Castings weighing up to 10 tons. Give resume of experience and references in first letter. All replies held confidential. Address: Box 519, FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

List past experience and also state salary expected in first letter. Must be familiar with foundry work. Address: Box 372, FOUNDRY, Cleveland 13 Ohio.

Help Wanted

FOUNDRY FOREMAN

Gray iron foundry, in Southern tier New York State, producing cored and pressure castings. Must be experienced in management of core room, molding floor, cleaning and grinding. Must be alert and have ability to handle and organize men. Top pay and employee benefits to right man. Write stating qualifications, all replies confidential. Address: Box 510, FOUNDRY, Cleveland 13, Ohio.

Representatives Wanted

REPRESENTATIVE NEEDED

We have an opening for a responsible salesman to represent us in Central Illinois, Quad-Cities and St. Louis areas on foundry refractories, sands and cleaning abrasives. Applicant must be familiar with foundry operations in both the ferrous and nonferrous fields. Give detailed information on background, names and length of service with previous employers, sales experience, age, salary requirement, and place of residence. Enclose picture or snapshot with application. All replies treated in strict confidence. Address: Box 516, FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVES

To make personal calls on foundries for FOUNDRY, checking on service to readers and selling subscriptions to key foundry personnel. Salary and bonus with expenses paid. If you are free to travel an assigned territory and have had sales or foundry experience, we suggest you tell us about yourself in a letter to: **FOUNDRY, BUSINESS MANAGER, 1213 W. 3RD, CLEVELAND 13, OHIO.**

METALS, MINERALS & CHEMICALS

Salesman, with industrial clientele, wanted on high commission basis. Write complete personal and sales data in confidence. Include small photo. Address: **BRAM CHEMICAL CO., 820—65TH AVE., PHILADELPHIA 26, PENNSYLVANIA.**

Positions Wanted

MANAGER—SUPERINTENDENT

Twenty-eight years of gray iron experience and some nonferrous. Outstanding practical and technical background. Have supervised as many as three hundred men, 125 tons daily, production and jobbing, mechanized or semi. Excellent cost man, ability to handle men and can obtain results. Age 47. Address: Box 443, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

College graduate with seven years' experience in all phases of foundry practice, five years in supervisory capacity. Experienced in light, medium, and heavy pressure and strength gray iron castings. Steady, age 32, married. Address: Box 500, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Wood and metal, large or small patterns. Driers and core boxes for core blowing. Know plaster work and pressure casting or cast in plastic for patterns. General experience, foundry rigging gates and usual foundry trouble work on patterns. Forty years first-class bench work and foreman in small and medium shops. Is forty years' experience on patterns any value in your shop on work where you can save money on scrap castings? Address: Box 512, FOUNDRY Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Successful background as superintendent in shops up to 300 men. Excellent record on quality control, organizing ability, production and costs. Technical and consultant experience on sand properties, cupola operation and mechanization. Gray iron, large or small, jobbing or production. Age 43. Address: Box 235, FOUNDRY, Cleveland 13, Ohio.

WORKS MANAGER

With outstanding background in open hearth and electric carbon and alloy cast steel. Foundry consultant on sand, metallurgical control and quality trouble-shooting. M.S. Degree. Now employed. Address: 499, FOUNDRY, Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

Positions Wanted

FOUNDRY MANAGER

Thoroughly experienced in operation, sales and the administration of a foundry in the light metals field. Free to make a change at this time. Successful record in handling help and in maintaining production schedules. Proven ability to revamp an organization in order to reduce costs and at the same time improve production and reduce scrap. Wants a man-sized job, where intelligent effort and practical experience are repaid. Address: Box 491, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Graduate engineer with over two years' experience in all phases of shell molding and three years in product development and engineering. Responsible for many developments in both experimental and production departments of shell molding. Complete charge of all experimental and pattern engineering. Address: Box 509, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRYMAN

Age 42, married, free to travel or relocate. Fifteen years practical experience with mechanical engineering training. Includes core room, melting, floor and machine molding, pattern layout, welding and cleaning room procedure. Also sales, personnel and administrative experience. Address: Box 496, FOUNDRY, Cleveland 13, Ohio

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Now representing a brass and bronze ingot smelter in Philadelphia. Looking for an additional line to call on ferrous and nonferrous foundries. Please write anytime. Address: **W. B. GREEN, 104 EAST ROOSEVELT BLVD., PHILADELPHIA 20, PENNSYLVANIA.**

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Practical progressive experience of 23 years in gray iron and nonferrous sand castings as journeyman and top executive supervision. Qualified to take charge of all operations in job or production foundry. Engineering education, outstanding labor relations, high productivity and low scrap ratio records. Age 45. Address: Box 503, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Engineer graduate, 15 years' experience in production of small and large gray and malleable iron castings. Well versed in engineering, scrap analysis, core, molding, and inspection problems. Will consider any job, anywhere, foreign or domestic. Address: Box 507, FOUNDRY, CLEVELAND 13, Ohio.

FOUNDRY MANAGER

Gray iron, brass, aluminum. Experienced in all phases of foundry operations, well versed in production procedures, all types of castings, sales. Small foundry in midwest preferred. Address: Box 505, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR EXECUTIVE ASSISTANT

Nineteen years' experience in iron and steel foundries in operations and management. Graduate engineer. Address: Box 481, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Twenty-six years in machine tool foundries. Experience covers all foundry operations. Specialized knowledge of foundry cost control, incentive systems, industrial relations, production methods and organization. Foundry consultant on sand and quality control, mechanization, cupola operation and general foundry problems. Age 42, now employed. Address: Box 427, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Progressive foundry superintendent. Familiar with every phase of the foundry. Background of practical experience on all classes of work. Now employed. Address: Box 513, FOUNDRY, Cleveland 13, Ohio.

YOUNG FOUNDRYMAN

Employed, married, age 36. Twenty years' practical experience, five years technical school, machine shop and metal patternmaking, fifteen years in nonferrous foundry making permanent mold, aluminum matchplates, driers, white metal, plaster of paris, follow board, Tamastone patterns. Cope and drag plates for heavy molding up to 1000 pounds, memorial tablets, navy work bushings, nickel blowers for mines, manganese, aluminum, bronze and nickel castings, gate cutting, risers. Operating all molding machines, ability to organize and handle men. Speak five languages fluently. Address: Box 508, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Twenty-eight years foundry experience. Production minded, capable in steel, iron or malleable foundries. Supervise on machines, core blowers or rollover. Address: Box 444, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY ENGINEER

Experienced in all phases ferrous and nonferrous. Desire position in management, supervision or engineering. Can direct all phases of foundry activity, foundry processing all departments, also estimating, pattern equipment and castings from prints. Sand, permold, and shellmolding. Production processing of above. Sixteen years' experience, nine in management. Age 33, will relocate, steady. Address: Box 455, FOUNDRY, Cleveland 13, Ohio.

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Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry machine and related lines. Address: Box 517, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Desires position as superintendent or general foreman. Practical man. Twenty-seven years' experience in gray iron, ductile iron and nonferrous, jobbing and high production shops, soil pipe and farm implements. Address: Box 447, FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

If your scrap is high and your costs are up, don't give up, answer this ad. I can help you. Practical foundryman wishing to make change. Have had practical experience in all phases of foundry operations, gray iron, high strength iron, brass and bronze. Preferably in Southern states. Address: 511, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN

To operate the cleaning division, steel, mill or gray, good background. Well qualified to handle any number of men or foremen. Years of experience in standards and methods. Address: Box 493, FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Several years of experience in gray iron, mill and steel. Will reduce cost and increase production. Very capable of running department efficient, also assist management in all problems. Address: Box 494, FOUNDRY, Cleveland 13, Ohio.

MASTER MECHANIC

Experienced modern mechanized foundry, have developed successful preventive maintenance program; heavy machine shop background. Nine years responsible supervisory experience, references. Address: Box 515, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 437, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER AND METALLURGIST

Married, 30, degree in Metallurgical Engineering, ten years' foundry experience including four years' supervisory experience, desire management position in small or medium size ferrous or nonferrous foundry. Address: Box 470, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

With 36 years of practical experience. Familiar with brass, bronze, and aluminum, also able to read blueprints. Free to travel, dependable. Address: Box 502, FOUNDRY, Cleveland 13, Ohio.

EXECUTIVE

Experienced in all phases of foundry operations. Steel, iron nonferrous, plant and industrial engineering, cost control, accounting, industrial relations, machining administration. Address: Box 408, FOUNDRY, Cleveland 13, Ohio.

SALES TERRITORY WANTED

In Michigan, Indiana or Ohio with a foundry company or a company serving the foundry industry. Mechanical and metallurgical engineering graduate. Experienced as melting superintendent, foundry superintendent, customer contact and manager. Good appearance. Pleasing personality. Address: Box 462, FOUNDRY, Cleveland 13, Ohio.

WANTED

To represent a foundry supply house in New York State, Pennsylvania or both on commission basis. Have wide experience in this field with valuable contacts. Address: Box 520, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

GENERAL FOREMAN

For steel cleaning room. Can assume full responsibilities of cleaning steel castings with the most modern methods. Address: Box 501, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN

Large or small castings in grey iron or nonferrous, green or dry sand. Twenty years' practical experience in all foundry details. New Jersey preferred. Address: Box 472, FOUNDRY, Cleveland 13, Ohio.

Available Capacity

AVAILABLE CAPACITY

Immediate available capacity for permanent mold aluminum castings. Forward drawings and inquiries to:

THE HEAT-X-CHANGER CO., INC.
BREWSTER, NEW YORK

Wanted-To-Buy

WANTED
MOLDING MACHINES

3—Osborn #276-J Molding Machines
1—Osborn #443 Molding Machines
4—Osborn #712 Molding Machines
2—Osborn #714 Molding Machines
MUST BE IN EXCELLENT CONDITION
MARCH BROWNBACK CO., INC.
POTTSTOWN, PA.

WANTED

Gas fired annealing oven with following specifications: 18 to 20 feet long, 4' by 3' opening with 3' chain conveyor. Must be Cycle Conveyor and with heat up to 1750° F. Also a walk in cabinet type shot blast. Address: **PAUL M. WIENER FOUNDRY CO., MUSKEGON, MICHIGAN.**

WANTED TO BUY

Used—straight jolt machine—must be in good condition and have a capacity 24,000 to 27,000 lbs. with a cylinder 18" to 20" diameter bore.
BOX 483
FOUNDRY CLEVELAND 13, OHIO

WANTED

Modern type transformer for Arc Melting Furnace. Approximately 75000 KVA 13200 primary voltage.

THE LOCOMOTIVE FINISHED MATERIAL CO.
ATCHISON, KANSAS

WANTED TO BUY

A small brass foundry, located in either Pennsylvania or surrounding territory, such as New Jersey, Delaware or Maryland. Address: Box 490, FOUNDRY, Cleveland 13, Ohio.

WANTED

Hines pop-off Aluminum flasks and pouring jackets. All sizes. Must be in excellent condition. Address: **MARCH-BROWNBACK CO., INC., POTTSTOWN, PA.**

MACHINERY WANTED

Induction Furnaces, Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: **P.O. BOX 1351, CHURCH STREET STATION, NEW YORK 8, NEW YORK.**

WANTED TO BUY

Used "Mulbaro" in good condition. State age and price. Address: **BADGER IRON WORKS, MENOMONIE, WISCONSIN.**

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

SAND TEST EQUIPMENT WANTED
IN GOOD CONDITION

Rammer and specimen tube, permeability meter, hand operated strength machine, oven, sand washer and bottle, testing sieves (12) and sifter, possibly other.

BOX 748
SPRINGFIELD, OHIO

CLASSIFIED ADVERTISING

Employment Service

EMPLOYMENT COUNSEL, INC.

"All The Name Implies"

JOHN COPE, Manager Foundry Dept.

Recruiting men for employers in the foundry industry throughout the nation. Openings in steel, Malleable, Gray Iron and Non-Ferrous—Jobbing and Production. Salaries to $20,000.

PLANT MANAGERS
GENERAL FOREMEN
CORE FOREMEN
CLEANING FOREMEN
PATTERN FOREMEN
INDUSTRIAL ENGRS.

SUPERINTENDENTS
MOLD FOREMEN
MELTING FOREMEN
MAINTENANCE FOREMEN
METALLURGISTS
TIME STUDY ENGRS.

And all other Administrative and Sales Positions.
WRITE or CALL for registration.
Completely Confidential

SUITE 500
CHICAGO 2, ILLINOIS

7 WEST MADISON ST.,
FINANCIAL 6-2100

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Opportunity

OPPORTUNITY

Modern equipped, gray iron foundry for rent. Daily pouring capacity 50 tons, must make our casting requirements approximately 6 ton a day. Located in the Western part of New York. Address: Box 485, FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOR SALE

Well equipped grey iron foundry and machine shop in the center of North Dakota's oil boom. One of the greatest opportunities in the Northwest. Under the same management for fifteen years. Reason for selling—ill health. Call or write: **MINOT FOUNDRY CO., MINOT, NORTH DAKOTA.**

FOUNDRIES FOR SALE

IRON FOUNDRY producing 15 tons of high quality castings per day. Latest type equipment for high production runs.

IRON FOUNDRY completely mechanized plant producing 100 per day.

IRON FOUNDRY producing 7 tons small and medium jobbing castings per day. Price $40,000, easy terms.

EDWARD H. ZOLL
FOUNDRIES SOLD AND LEASED
790 BROAD STREET
NEWARK 2, NEW JERSEY

FOR SALE

Gray iron foundry located Southern Massachusetts well-equipped in every respect for production work. Excellent clientele with good volume of business on hand. Low price. Excellent venture for working partners. Address: Box 479, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOR SALE

Small sail pipe foundry, fully equipped. If interested write: **J. R. HUFF, 213 WEST 74TH STREET, SHREVEPORT, LA.**

FOR SALE
RENT OR PARTNER

Foundry centrally located. Large outside area. Gray iron and brass. Equipped for hand molding. Terms can be arranged. For further information write to:

BARNETT BROTHERS FOUNDRY
118 MAPLE AVENUE PUNXSUTAWNEY, PA.

Foundries For Sale

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

FOR SALE

Brick and steel foundry, Southern Illinois, 160 x 320 feet, overhead monorail water transportation available. Ideal for mechanized operation, contains equipment. Address: Box 391, FOUNDRY, Cleveland 13, Ohio.

For Sale

GOVERNMENT SURPLUS
MOLDING MACHINES

(30) Model 601-13 and 2047-3 Osborn Jolt Rollover Squeeze Pattern Draw molding machines. 30"—800 lb. capacity. New price approximately $3500.00.
OUR PRICE .....$350.00 each
Here is your chance to replace your old type machines for late models.

BALCHER MACHINERY COMPANY
1884 S. Compton Road
Cleveland Heights 18, Ohio
Telephone: FAirmount 1-1186.

FOR SALE

Induction Melting Unit

150 KW—960 cycles

two Furnaces

NEW ROCHELLE TOOL CORP.

320 MAIN STREET NEW ROCHELLE, N. Y.

NE 2-555

CHAPLET MANUFACTURING BUSINESS FOR SALE

8—Butt welders for double heat chaplet 5 to 30 KVA
1—Spot welder for single head chaplet—30 KVA
1—1" Acme header and furnace for forged chaplets
Tinning Room equipment, steel bars and plates.

THE FEDERAL FOUNDRY SUPPLY COMPANY
4600 EAST 71st STREET CLEVELAND 5, OHIO

FOR SALE

Clearfield #920 Mixer, excellent condition, Serial 205-C. Complete with motor and starter. Address: **WM. P. LAYTHAM & SONS FOUNDRY, 925 MARKET STREET, PATERSON, NEW JERSEY.**

For Sale

FOR SALE

MELTING EQUIPMENT

1—400 G.T. Hausfeld—oil fired—tilting
1—Strohman Aluminum furnace—350# cap.—stationary
1—1200# Hausfeld tilting aluminum furnace—gas fired
7—Monarch Furnaces with blowers—barrel type
1—Hausfeld #40 Stationary furnace—Lab. type

BLOWERS

1—Allis Chalmers Turbo Blower—8500 CFM at 1.5# pressure
1—Spencer Turbine Blower—15 HP—1750 RPM —1350 CFM at 24 oz.
2—48" Blowers—20 HP—Low Pressure
1—North American 10 HP—1300 CFM at 16 oz.
1—North American 4 HP
3—North American 5 HP—600 CFM at 16 oz.
1—General Electric 30 HP Blower—5700 CFM at ¾ # pressure
1—Rotoclone Type "D"—Size 10W

AIR COMPRESSORS

1—30 HP Ingersoll Rand Type ES-1—9 x 9—153 CFM—3/60/220-440

SAND HANDLING

2—Tractor Sand Slingers, 16" head.
1—Mobile Sand Slinger—300 cu. ft. tank
1—Rotary oil fired sand dryer—42" x 20' long
1—Speed Muller #60-41—10 cu. ft.—skip hoist—aerator
1—Molder's Friend—2 sand cutters
1—9' Tablast Wheelabrator
Sand Testing Equipment

MOLDING MACHINES

1—Johnston & Jennings 815B Rollover
1—Johnston & Jennings 683 Jolt Stripper
125 Machines in stock. All types
8—Core Ovens. All types.
10 & 15 Ton Bottom Pour Ladles
16—1000 & 1500# Worm geared ladles
100 Tons Steel Flasks, core plates, small flasks, send for lists.

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD STREET
SHILLINGTON, PENNA.
PHONES—READING—30311—40146
R. B. HARRISON, MGR., FDRY. DIV.

AVAILABLE FOR IMMEDIATE DELIVERY

One 2-Mev Van de Graaff Generator, output 140-r per minute at 70 cm., inherent filtration equivalent to 6 mm. lead. Rugged construction, stable and dependable output. Suitable for industrial radiography, for research (particularly where an electron current greater than 400 microamperes is desirable), or for radiation therapy.
Can readily be converted to proton or deuteron accelerator.
Offers and bids welcome. Will consider exchange for equipment or materials needed for hospital expansion program.
Further details, photographs, or blueprints available on request.

BOX 497
FOUNDRY CLEVELAND 13, OHIO

GAS GENERATING UNIT

500,000 cu. ft. Holder
5 Gas Generators
5 Igniters, 10 Ash Cars
5 Washboxes
3 Blast and 2 Gas Blowers
Automatic Controls
Lubricators, Pumps, Scrubbers, etc.

EASTERN KENTUCKY SCRAP CO., INC.
P.O. BOX 388 LOUISVILLE 1, KENTUCKY

MACHINERY FOR SALE

2—Johnston & Jennings jolt pin lift. Molding machines, 30" x 36" table, 10" draw. Address: GOLD FOUNDRY & MACHINE WORKS, 1618 SOUTH OSAGE ST., INDEPENDENCE, MO.

FOR SALE

Lectromelt 500 lb. UT top charge furnace. Little used. Address: Box 504, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EQUIPMENT

MOLDING EQUIPMENT

Herman Jolt Rollover #6000, 40" x 60", 1947
2—Herman Jolt Stripper, 48" x 54", 1947
Osborn Jolt Roll Over, model 405S, with Roll out Car 44" x 48"
Champion Stripper, 36" x 48" x 8", 1947
2—Int'l Portable Jolt Squeezer Power Pin Lift, PKL 12, 1947
3—Int'l Portable Jolt Squeeze Pin Lift, PKL 14, 1947
1—Int'l Roll Over, model G, 30 x 8, 1948

MOLD HANDLING & SHAKEOUT EQUIPMENT

Stoney Double Jolt Knockout
Simplicity 4 x 7 Shakeout, model B
Productive Shakeout 6 x 8
900 ft. 10" Logan Roller Conveyor 3½" dia
Jeffery Powered Wood Slat Conveyor

SAND HANDLING EQUIPMENT

Unit A Syntron Feeder Hopper, 6' x 6'
Rotary Screen Tumbler Barrel, 5' dia. x 12' lg
2—Aerator, Overshot type, 9' x 2' & 4' x 3'
2—36" Apron Feeder, 12'6" c to c
Aetna Sperser System
24" Apron Conveyor, Steel, Pan, 53' c to c
Simplicity Shaker, model C
Steel Hopper System
1—6' x 7' x 3'6"
1—12' x 7' x 3'6"
5—4'6" x 4'6" x 1'
Exhaust System
Piping
100 hp Motor
American Blower
Sludge Tank
Oil Froth Wet Dust Collector

CRANES & HOISTS

Budgit Top Running Bridge Crane #46, 15' span
15—Curtis Traveling Bridge, 15' span
16—Curtis Air Hoist, 5 & 6" Cylinders, 3½' x 4' Lifts

CUPOLA & LADLE EQUIPMENT

Roots Connersville Blower, 22 x 66, 75 hp
Roots Connersville Blower, 12 x 30, 20 hp
Geared Ladles

MISC. FOUNDRY EQPT. .

EXPLOSION PROOF FOUNDRY LIGHTS

2—Young Bros. Core Drying Oven 12' x 12' x 8'
B & P Screenarator.
American Sand Cutter, model AA
Baker Lift Truck, 6000# cap., 1948
Pangborn Rotoblast, 14' cap. with 5 five ft. tables
Logan Wood Slat Conveyor, motorized. 36" x 35' Roller Conveyor
7—18" Pedestal Grinders
Tons of Flasks cores, 1943
Core Blower, Champion, model CB400, 300 lb.
Gogan Brinell Testing Machine, Stationary, Floor type, model 2133, table 27½" x 24" x 7" high.
Spencer Turbo Blowers, 2250 cfm @ 16 oz—2850 @ 16 oz.
Roto-Clone units, 24W & 36W, with sludge ejectors
Vibrators, Osborn, 1⅝" x 2"
Welded Steel Pouring Crucibles, new. 1700#
Bottom Dump, Sand Buggies
Exhaust Fans—to 60"
Fire Extinguishers—CO2
Exhaust Blowers—all sizes

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE AVE.
CINCINNATI 32, O.
PHONE: MU 5465

For Sale

FOR SALE

MOLDING MACHINES
2—No. 275 Osborn jolt squeezers.
8—13 x 8 Tabor power squeeze flask lift machine split pattern type.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
4—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.
2—International PKL 14"-5½" Jolt Squeeze Pin Lift.
1—Tabor Pedestal Core Rollover Hand Ram Rollover Draw 14 x 20 table 8" draw.

BLOWERS FOR CUPOLAS AND FURNACES
1—15 HP North American 2100 CFM at 16 ozs.
2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld Stationary Brass, Multiple gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order
New 1000 lb. aluminum cap. tilting crucible furnaces to specifications.

MISCELLANEOUS
1—Stoney crane type shakeout.
1—Dings type M magnetic separator.
1—NC-4 sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
25 Tons steel flasks in sizes from 26 x 26 to 60 x 60.
1—McLeod Small Sand Blast Barrel 24 x 24.
1—36W Wet Type Roto-Clone 34000 CFM.
1—24W Wet Type Roto-Clone 13000 CFM.
Complete stock of rebuilt mill and dust exhaust blowers.
1—27 x 36 American wheelabrator, tumblast with rubber belt.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

EQUIPMENT FOR SALE

2—Osborn #601 jolt rollover pattern draw machines.
1—Milwaukee #60-B jolt rollover pattern draw machine.
1—American Wheelabrator tumblast 27 x 36 without skip hoist.
1—American Wheelabrator tumblast 36 x 42 with skip hoist.
1—American AM sandcutter.
1—American A.A. sandcutter gasoline driven.
2—U.S. Johnston & Jennings #2 jolt squeeze pinlift machines.
2—Tabor portable jolt squeeze pin lift machines.
All the above equipment is in good condition and priced to sell.

MARCH BROWNBACK CO., INC.
POTTSTOWN, PA.

FOR SALE

1—Internation Type PK Jolt Squeeze Pin Lift, 18" Cylinder, 8" Lift.

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE

2 sets Tabor Pneumatic Jar Rollover machines with 2 sets Pin Lift Pneumatic machines suitable for work on light molds up to 24" wide by any length flasks. Price: $750.00 per set, F.O.B. Griffith, Indiana. Address: **KEEN FOUNDRY COMPANY, GRIFFITH, INDIANA.**

FOR SALE

New Tabor Junior Sandrammer. Also used for core ramming. New price $3,500.00. Will sell for half price. Address: **SILVER KING CORP. P.O. BOX 773, AURORA, ILLINOIS.**

For Sale

FOR SALE

6—Osborn #2047 Jolt Rollovers; 600 lbs. capacity 1943 Machines, Excellent Condition.
1—SPO Jolt Strip Squeeze Machine, 1948 Like New.
1—Osborn 814-P, Jolt Strip Squeeze, Excellent.
1—Osborn 405 Rollover, Good Condition.
4—Champion Pin-Lifts Size 42-6, A-1 Condition.
1—International Pin Lift, 42-6, A-1 Condition.
2—Simplicity Shakeouts, 3' x 3', new in 1948.
1—Simplicity Shakeout, 3' x 5', new in 1948.
1—Spencer 7350 C.F.M. 16 oz. 40 H.P. Motor.
2—Spencer 5400 C.F.M. 16 oz. 40 H.P. Motor.
1—Rheile Tester 100,000 lbs. Screw Type.
1—Rheile Tester 150,000 lbs. Screw Type.
1—Howe Platform Scale 4000# 4' x 5' Electric.
3—Tilting Furnaces, 800 lbs. capacity, Aluminum.
3—Holding Furnaces, 300 lbs. capacity, Aluminum.
1—Roll, 200' Rubber Belting, 18", 7 Ply, NEW.
1—Roll, 275' Rubber Belting, 30", 5 ply, NEW.
1—Bradley Hammer, 10 H.P. Motor, 1945 Machine.
1—G.E. Battery Charger, M.G. Set, NEW.
G.E. Arc Welders, 400 amps, 220/440, very late.
U.S. Electric Double End Snag Grinder, 7½ h.p., 220/440, 3 ph. 60 cy., 4 speeds, late.

LIFT TRUCKS
1—Clark Fork Lift Truck, 6000 lbs. 108" Lift.
1—Brownie Fork Lift Truck, 3000 lbs. 9' Lift.
1—Towmotor Fork Lift Truck, 5000 lbs. 9' Lift.
1—Automatic Platform Lift Truck, 5' Lift, 3000 lb. Electric, 1946 Machine, Excellent Condition.
5—Lewis-Shepard Jack Lift Trucks, 4000 lbs. capacity, Hydraulic, New in 1950, A-1 Shape.
HOISTS, AIR: ELECTRICAL: MECHANICAL. A-1.
LARGE ASSORTMENT OF HINES ALUMINUM POP OFF FLASKS AND JACKETS, STEEL FLASKS: VARIOUS ALUMINUM & TRANSITE CORE PLATES. EQUIPMENT LISTS AVAILABLE ON REQUEST.

A.A.A. MACHINERY & EQUIPMENT CO.
856 EDDY ROAD CLEVELAND 8, OHIO

TESTING MACHINES

1—Riehle 400,000# hydraulic and beam type Compression Testing Machine
1—Riehle 200,000# Universal
2—Riehle 100,000# Universal
1—T. Olson 100,000#
Also Simpson Sand Mixers, #0, #1, #1½, #2, #3
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.
OUR 36th YEAR

CONSOLIDATED PRODUCTS CO., INC.
13-20 PARK ROW NEW YORK 38, N. Y.
TELEPHONE: BARCLAY 7-0600

FOR SALE

30—Osborn Manufacturing Company Jolt Rollover Pattern Draw Machines, size 21¼ x 22¼, maximum 11½", minimum 10", pattern draw 8".
1—Link Belt Pig Mold Conveyor.
ATTRACTIVELY PRICED

KARL NUSSBAUM AND SONS, INC.
29th AND GARLAND AVENUE
LOUISVILLE 11, KY.
RAYMOND 5741
(ASK FOR WALTER NUSSBAUM)

FOR SALE

Osborn #401 power jolt rollover molder. Located in Detroit, new in 1941. Address: **JOHNSON MACHINERY, 683 FRELINGHUYSEN AVE., NEWARK, NEW JERSEY, BIGELOW 8-2500.**

FOR SALE

1—#9336 SPO Jolt-Squeeze Clamp-Rollover, draw molding machine with 800 lb. capacity. Never used. Address: **WOOD NEWSPAPER MACHINERY CORP., 683 SOUTH SECOND STREET, PLAINFIELD, NEW JERSEY.**

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY BRINGS RESULTS!

IT COSTS BUT LITTLE. WHY NOT RUN AN ADVERTISEMENT ABOUT YOURSELF IN TWO OR THREE ISSUES?

WRITE

FOUNDRY
CLASSIFIED ADVERTISING DEPT.
PENTON BLDG., CLEVELAND 13, OHIO

CLASSIFIED ADVERTISING

For Sale

FOUNDRY EQUIPMENT
AIR HOISTS

4000# Ingersol Rand Model D.

AIR TROLLEYS

2—Ingersol Rand 2000# to 6000# capacity air motor driven.

BLOWERS

Spencer Turbo Blower, 4500 CFM @ 32 oz., Serial 44788, 220-440 V., 60 HP, G.E. triclad induction motor. New Dec. 1946.

CORE BLOWERS

Demmler 3 E Dropaway Draw Type. New 1946.
Redford Bench Type Core Blower. Extra cylinders and clamps.

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton 1946 P & H Double Girder cab operated 30' 6" span, 3 motors, 220 volt AC 15' lift.
10 ton Northern Bridge Crane, double girder, box frame, fish belly, 230 V. D.C. 54' 7½" c to c of wheels. 3 motors. May be cut down to fit smaller span.

YARD CRANES

Hughes Keenan MC-4, 15,000# capacity Truck Crane, solid tires, all weather steel cab and heater. Telescopic boom 12' to 18', gasoline engine. Excellent condition.
Krane Kar, 10,000# Model AX, telescopic boom 12' to 18', solid tires, gasoline engine. Rebuilt, guaranteed.

GRINDERS

Fox Swing Frame Grinder, 10 HP, 220-440 V. G.E. motor.
Ransom 8 B Double End Snagging Grinder, 220 volt motor.

MELTING EQUIPMENT

5—New Stroman 1000# Aluminum Melting Furnaces, Type SD-1. Oil fired manual tilt type, completely lined, in original crates, with 3 HP Stroman Blowers.

MOLDING MACHINES

1—Hermann Rollover Pattern Draw 20 x 30" with bumper 6" cylinder. New 1942. FOB Erie, Pa.
1—Hermann High Speed Jolt Rollover, 4000#, 36 x 60" with 32 x 48" bumper, 12" cylinder, with pattern device. New 1940. FOB Erie, Pa.
1—Tabor 1000# Rollover Molding Machine 30 x 51", New 1944. FOB Erie, Pa.
1—Osborn Portable Jolt Roolover Pattern Draw, Model 601-13, 30" x 24" flask size, 10" draw, 900# cap. FOB Ordill, Ill.
1—International 13" PJS Jolt Squeeze Molding Machine. Stationary 18" x 26" table.
2—Beardsley & Piper Champion Pin Lift Pushoffs 44" x 44"—12" draw. New 1948.
2—Beardsley & Piper Champion Pin Lift Pushoffs. 32" x 36"—8" draw.
2—Champion Molding Machines JSL-12P.

MULLERS

Simpson #3 Model H Style B with blower, hood cooling system and rotary screen.
2—Clearfield 610, Timken Bearings, 20 HP motors. FOB Erie, Pa.

SHAKEOUT

3' x 5' Link Belt, 220 V. motor. Excellent condition. FOB Erie, Pa.

WHEELABRATORS

1—36 x 42" American Wheelabrator, Series 370 Tumblast. Used very little. 15 HP main motor, 3/60/220-440 V.
We buy complete foundries or foundry equipment for cash—for liquidation. Get our prices before you sell.

ACME EQUIPMENT CO., INC.

126 S. CLINTON ST. CHICAGO 6, ILL.

PHONE: ANdover 3-3430

For Sale

FOR SALE

2-TON HERROULT TILTING TYPE ELECTRIC STEEL FURNACE, side charge, inside dia. of shell 7'3", Transformer cap. 1000 to 1500 KVA at charge of 5000 to 6000#. Complete with 1500 KVA Transformer, 11000/2250 volts, 339 KVA Reactor, (3) Allis-Chalmers D. C. Generators with 7½ HP A.C. motor 3/60-220/440, with extra head, carbon stick electrodes and heads, Serial #147, Electrode Control System installed new in 1947.

INDUSTRIAL PLANTS CORPORATION

90 W. BROADWAY NEW YORK 7

BArclay 7-4185

FOR SALE

One Mommert Dixon Swing Grinder with 10 H.P. motor in good condition—$800.00 Price includes three 24" x 2½" x 12" grinding wheels, two for cast iron and one for steel. Address: **WERNER FOUNDRY & MACHINE CO., LANSDALE, PENNSYLVANIA.**

FOR SALE

American Sand Cutter, size 69 by 45, Model AM. Address **PIKE MACHINE COMPANY, 23460 LAKELAND, CLEVELAND 23, OHIO. PHONE REdwood 1-1880.**

FOR SALE

Late type Tabor cut-off saw, 5 h.p. motor, will cut 8" dia., cuts at angle with even table. Table can be raised and lowered. Address: **JOHNSON MACHINERY CO., 683 FRELINGHUYSEN AVE., NEWARK 5, N. J.**

FOR SALE

Tabor Pneumatic Molding Machine, 10 inch squeeze	Price $ 135.00
Farwell Portable Hand Squeeze Machine, 13 inch	Price $ 65.00
Royer Sand Blenders	Price $ 175.00
Sanditioner Jeffrey, No. 1, capacity 10-15 tons per hour	Price $ 400.00
American No. 2 Wheelabrator tablast with 8-24" multitables	Price $2750.00
Pangborn EN 2 Cabinet	Price $ 250.00
Ruemelin Sand Blasting Cabinet with turn table	Price $ 275.00
Sand Blasting Room, 13' x 7', walk in, gravity feed, 2000 lb generator	Price $ 450.00

Dust Collectors: American, Pangborn

M. ELSTEIN
141 MANGIN STREET
NEW YORK 2, NEW YORK

FOR SALE

Motors, Generators, Transformers from 1 HP to 2500 HP
World headquarters for T.E.F.C. and explosion proof motors.
World's largest inventory.

ELECTRIC EQUIPMENT CO.
ROCHESTER, N. Y.

FOR SALE

1—#40-50-60 crucible size style 180 Hausfeld Furnace, complete with motor and blower. A-1 condition. Address: **THE GOEHRINGER FOUNDRY SUPPLY CO., 919 W. FIFTH STREET, CINCINNATI 3, OHIO.**

FOR SALE

One (1) Model 2C American Wheelabrator Suction Blast Cabinet. One (1) #2 Model 70 B Dust Collector. Like new and unused condition, complete with all accessories. Best offer accepted. Address: **ELECTRIC HEATING EQUIPMENT COMPANY, 26 S. 32nd STREET, PHILADELPHIA 4, PENNSYLVANIA.**

FOR SALE

Sly Tumbling Barrel—24" diameter x 60" x ¾" plate. Type C tumbling mill complete. 3 Hp TEFC motor with starter. Address: Box 487, FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

1—500 pound Smith Acetylene Generator, like new, never uncrated, also two (2) used 200 pound generators.

FEDERAL STEEL PRODUCTS CORP.

415 N. ST. CHARLES HOUSTON, TEXAS

FOR SALE
TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6750	24 oz.	Spencer	800	8 oz.	No. Am.
4500	16 oz.	G.E.	675	16 oz.	Spencer
4000	42 oz.	Spencer	660	20 oz.	A-B
3500	40 oz.	Spencer	500	10 oz.	No. Am.
2800	1 oz.	Spencer	400	4.3 oz.	Spencer
2700	16 oz.	No. Am.	340	20 oz.	A-B
2700	16 oz.	Spencer	320	12 oz.	Spencer
2500	7 oz.	Sturt.	225	16 oz.	Spencer
2200	16 oz.	No. Am.	180	15 oz.	Spencer
2000	2½ oz.	Spencer	9100	7" SP	Sturt.
2000	1 oz.	Spencer	1100	4½" SP	Bayley
1150	20 oz.	No. Am.	100	7" SP	Spencer
1000	12 oz.	No. Am.			

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

1—Type S Screenerator, rubber tires and miscellaneous spare parts, Beardsley & Piper $275.00
1—Campbell Hausfeld manual tilt (550# Aluminum capacity) furnace with blower, crucible and two extra base blocks $450.00
1—#80 Stroman Stationary furnace with Hutchinson crucible tongs and new crucible $180.00
1—400# capacity paddle type Core Sand Mixer $160.00
Lot miscellaneous used slip and snap flasks
1—Cherry Adams 12 x 16 pop-off flask
Assorted used jackets.

HAMLIN CASTING CORPORATION
P.O. BOX 192 EDWARDSVILLE, ILLINOIS

FOR SALE
SAND BLAST EQUIPMENT

Wheelabrators-Tumblast size 48 x 42. $3000.00 to $4000.00.
Wheelabrator size 48 x 48. Like new. $5250.00.
Wheelabrator 27 x 36 Tumblast good condition—rubber belt. $3000.00.
Wheelabrator Tumblast 36 x 42. $4500.00.
Sly-master Blast size 36 x 42. Good condition.
Pangborn ES-207 Blast Cleaning Cabinet used for Strip steel or bar stock. $1750.00.
Pangborn 8 ft. table. Like new. $3500.00.
Sand Blast Cabinets, pressure tanks, dust collectors and blowers. All sizes.
Contact us for your sandblasting needs or any surplus sandblasting parts and equipment you have for sale.
Will accept your small machines as trade in on any of the above equipment.

DIAMOND SAND BLAST, INC.
5654 WEST JEFFERSON
DETROIT 9, MICHIGAN

FOR SALE

1—American Sand Cutter—60" $350.00
1—American Sand Cutter—72" $300.00
Good supply of spare parts for each machine.

BUCK IRON CO., INC.
RD #1 QUARRYVILLE, PA.

FOR SALE

No. 4 Sly Blast Mill and Dust Collector. Condition excellent. New barrel recently installed. Price $1200.00.

THE UNION CHAIN & MANUFACTURING CO.
SANDUSKY, OHIO.

FOR SALE

Molding Machines

3—#2166 Spo Jolt Squeeze Pin Lift
4—#814-P Osborn Jolt Squeeze Pin Lift
1—6000# Herman Rollover, Jolt and Pattern Draw 42" x 90"
1—#405 Osborn Jolt Rollover and Pattern Draw
5—#601-13 Osborn Jolt Rollover and Pattern Draw
4—#2047-4 Osborn Jolt Rollover and Pattern Draw for cylinder head core production
1—30" x 40" Tabor Jolt Rollover and Pattern Draw, 1000#, 12" draw
1—SA-34 Davenport Jolt Rollover and Pattern Draw, 2500# jolt cap., 15" draw, 34" x 48" table, flask 36" x 64"
1—SA-28 Davenport Jolt Rollover and Pattern Draw, 1500# jolt cap., 12" draw, table 30" x 40"
1—34-A-JS Davenport Jolt Pin Lift, 2500# cap. 12" draw, 36" x 46" table
5—Champion Draw Power Pushoff Machines 10" draw, 38" x 40" table
4—International Type JFL Jolt Ram, Foot-lever Pin Lift.

Core Room Equipment

1—#1 Demmler Core Blower
6—#92 Osborn Core Blower
1—20" Paddle type sand mixer
2—#3 Simpson Mullers
3—#2 Simpson Mullers
2—#70 Beardsley-Piper Mullers
1—Revolving Core Conveyor Table
1—Link-Belt Core Breaker Drum approx. 6' x 10'
1—Kane & Roach Wire Straightener 3/16" to ½" wire, 7½ HP. 440 V. 3/60
Various sizes transite core plates

Cleaning and Grinding

1—48" x 42" American Wheelabrator
2—Fin Cleaning Machines for cleaning cylinder heads
1—3 H.P. double stand grinder—flat belt drive 220/440/-3/60
1—10 H.P. double stand grinder — direct connected 220/440/3/60

Misc. Foundry Equipment

1—4' x 10' Robbins Shake-out with 7½ H.P. motor 220/440/3/60.
1—4' x 6' Simplicity Shake-out, Model D, 1600# cap. 10 H.P. 220/3/60.
1—500# Hausfeld hand tilt furnace
3—Stationary Sand Slingers—Beardsley-Piper
2—#3 Jeffrey Vibrators for Shakeout
4—#4 Jeffrey Vibrators for Shakeout
1—50 H.P. Spencer Turbine Cupola Blower 16 oz. 220/440/3/60.
1—20 H.P. North American Turbine Blower 24 oz. 220/440/3/60.
2—3 H.P. Blowers for furnaces 16 oz. 220/440/3/60.
1—Pig Mold Conveyor (Link-Belt) 74' lg. complete with drive for aluminum and magnesium.
2—1000 Gals. p. min. Centrifugal Pumps, Ingersoll-Rand, 52 ft. head, 5" suction, 4" discharge, dir. connected to 20 H.P. 220/440/3/60, Rebuilt.
Various sizes steel flasks, Hines Popoff flasks and jackets.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

15019 Saranac Rd., Cleveland 10, Ohio — Telephone—GLenville 1-1538

CLASSIFIED ADVERTISING RATES

POSITION WANTED — Minimum advertisement set solid, 30 words or less, $2.50. Additional words 9c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $5.00. Additional words 15c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

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Single Column 2¼" Wide	One Time	Three Times	Six Times	Twelve Times
1 inch	$ 15.00	$ 13.75	$ 12.50	$ 11.25
2 inches	27.00	25.00	23.00	21.00
3 inches	40.00	36.50	33.50	30.00
4 inches	50.00	46.00	41.50	37.50
5 inches	60.00	55.00	50.00	45.00
6 inches	73.50	66.50	60.00	53.50
7 inches	82.50	75.00	67.50	60.00
8 inches	91.50	83.50	75.00	66.50
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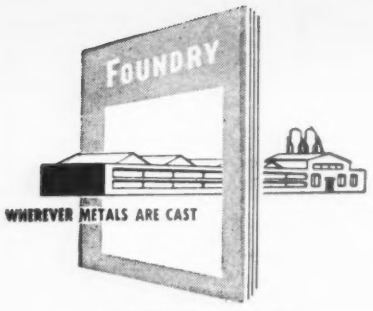
Full Page	275.00	250.00	225.00	200.00

Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

Penton Building, Cleveland 13, Ohio



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Also publisher of STEEL • MACHINE DESIGN
NEW EQUIPMENT DIGEST

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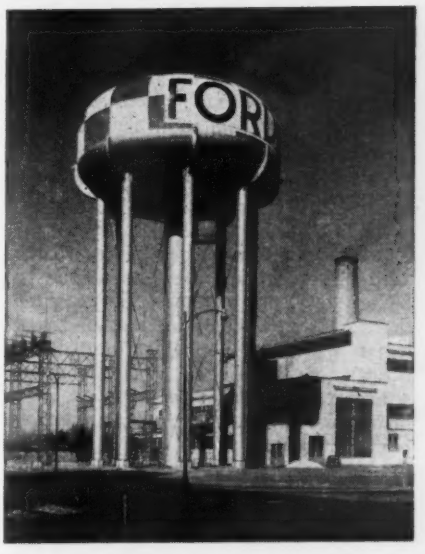
Dear Reader:



The Foundry Ford Built: You'll recognize the new Cleveland foundry from this landmark the next time you fly to Cleveland. We are indebted to the Harlan Electric Company of Toledo, general electrical contractors for the Ford plant, for this dramatic shot. We can't wait until we get out to the Ford foundry again so we can take this particular picture in color with the camera our wife gave us for Christmas. Good subject, don't you think?

—o—

FEF: We were impressed with Foundry Educational Foundation's trade mark and asked Executive Director George Dreher for an explanation of its symbolism which is . . .

"The three-part flask and triangular background represent the three elements with whom the Foundation works: students, and Universities, and the industry. The flask further represents the flexibility of the casting process which permits the casting of complex forms for engineering use. The young man represents a clean cut youth with sleeves rolled up and not afraid to work. You will

(Next page please)

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note that his trousers are rather substantial corresponding to shop clothing, that his shirt, in turn, corresponds to another piece of shop equipment and the tie to indicate he is a member of the supervisory-management team. In other words, he is ready to talk with an engineer, to deal with people in the plant or to run equipment or to jump into his coat and accompany someone on a visit to a customer. The roll he holds represents the basic method of communication among engineers—the blue print."

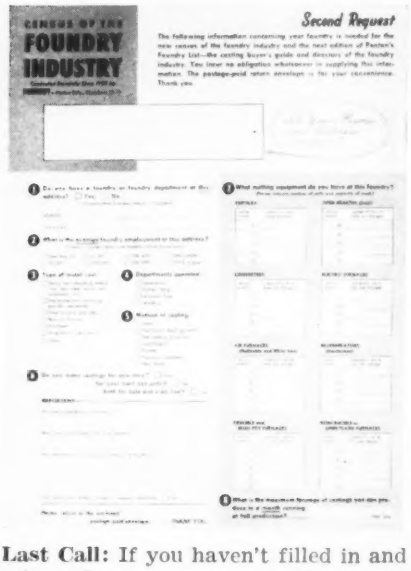
—o—

Don Cadot: Our capable Art Editor who is responsible for the attractive covers of FOUNDRY and inviting editorial layouts each month is directing a grand job on the forthcoming March Ford issue. We previewed some of the work being done on this issue and predict you'll find others borrowing your copy and keeping it longer than usual.

—o—

We recommend: For thoughtful reading—recently published reports of the President's Materials Policy Commission. Especially Vol. I (Foundations for Growth and Security), and Vol. II (The Outlook for Key Commodities). Here you will find estimates indicating an increase by 1975 of total national output approximately double that of 1950 . . . population increase from 151 to 193 million . . . a working force of 82 million . . . a work-week perhaps 15% shorter than 1950. The reports are available (Vol. I is $1.25, Vol. II, $1.50) from the Supt. of Documents, U. S. Government Printing Office, Washington.

—o—

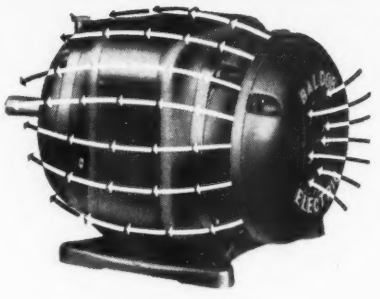

CENSUS OF THE FOUNDRY INDUSTRY

Second Request

Last Call: If you haven't filled in and returned your copy of FOUNDRY's 1953 Census of the Foundry Industry, we urgently request that you do so.

Business Manager

FOUNDRIES NEED THIS *Totally enclosed* MOTOR



Arrows indicate the forced air movement over the entire exterior of the BALDOR STREAMCOOLED® motor frame.

The BALDOR® STREAMCOOLED *Motor*

These BALDOR ball-bearing motors are SOLIDLY ENCLOSED, cooled by an outer-mounted fan in the bell-end. They cannot inhale dirt, dust, grit or metal particles. BALDOR STREAMCOOLED Motors require no dismantling for cleaning. Thus less servicing—no interruption of production. Let us tell you more about these long service life BALDOR Motors (which are sold and serviced in more than 300 Trade Centers).

BALDOR ELECTRIC CO.
4353 DUNCAN AVE. • ST. LOUIS 10, MO.

Baldor

MOTOR SPECIALISTS FOR 30 YEARS

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"she might have been my kid..."

"There was no time to stop, see? She comes running out from behind this parked car right under my wheels. Her hair is in pigtails, and with the sun shining on it, she might have been *my* kid. We got her to the hospital. It took 3 pints of blood to bring her around. All I have to do is remember the sound of those screaming tires—and I know why *I'm* giving blood."

Yes, all kinds of people give blood—truck drivers, office workers, salesmen. And—for all kinds of reasons. But whatever *your* reason, this you can be sure of: Whether your blood goes to a local hospital, a combat area or for Civil Defense needs—this priceless, painless gift will some day save an American life!

Business Executives!

✓Check These Questions!

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Has your company given any recognition to donors?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed your employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Have you conducted a Donor Pledge Campaign in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

Give Blood Now

CALL YOUR RED CROSS TODAY!

NATIONAL BLOOD PROGRAM

A PUBLIC SERVICE PROJECT THE ADVERTISING COUNCIL

MECHANICAL HANDS

FOR YOUR POUR-OFF MEN . . .

Model "FA" Pouring Device with quick-detachable bail and 16½" ladle receiving 325 lbs. of brass.

Working Together with Practical Foundrymen . . .

MODERN engineers developed the mechanical Pouring Device . . .

Quickly taken for granted were the vastly increased tonnages at the pay scales, improved quality of castings and lowered costs. In later years SAFETY methods and HAPPIER working conditions, which were brought about by the Pouring Device, won further acceptance for mechanical pouring.

Today in thousands of foundries everywhere MECHANICAL HANDS, with human-like precision, reach in to lift out heavier loads of white-hot metal. Each new application suggests other and expanded uses:

For Both Ladles and Crucibles

MODERN pouring Devices in four, basic, standard designs in a broad range of lifts and for metal loads from 100 to 1000 pounds is but half the story. There are specials, too! MODERN engineers design and build special devices to do the reaching and lifting in the most difficult places. If your problem is a special one write it up for our full consideration. If it's a standard requirement the coupon can serve as our guide to your needs.

Model "E" Device with plain-hook bail, safety-lock-crucible-shank and No. 60 crucible.

MODERN EQUIPMENT CO.
PORT WASHINGTON, WISCONSIN

MODERN EQUIPMENT CO., DEPT. F2-53, Port Washington, Wis.
Mail to my attention:
Catalogs on metal pouring systems and ladles ☐
Cupolas and cupola chargers, 147-A ☐
Cranes and monorail systems, 150 ☐
More information on FREE use of Modern films ☐

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Street ..... Zone .....
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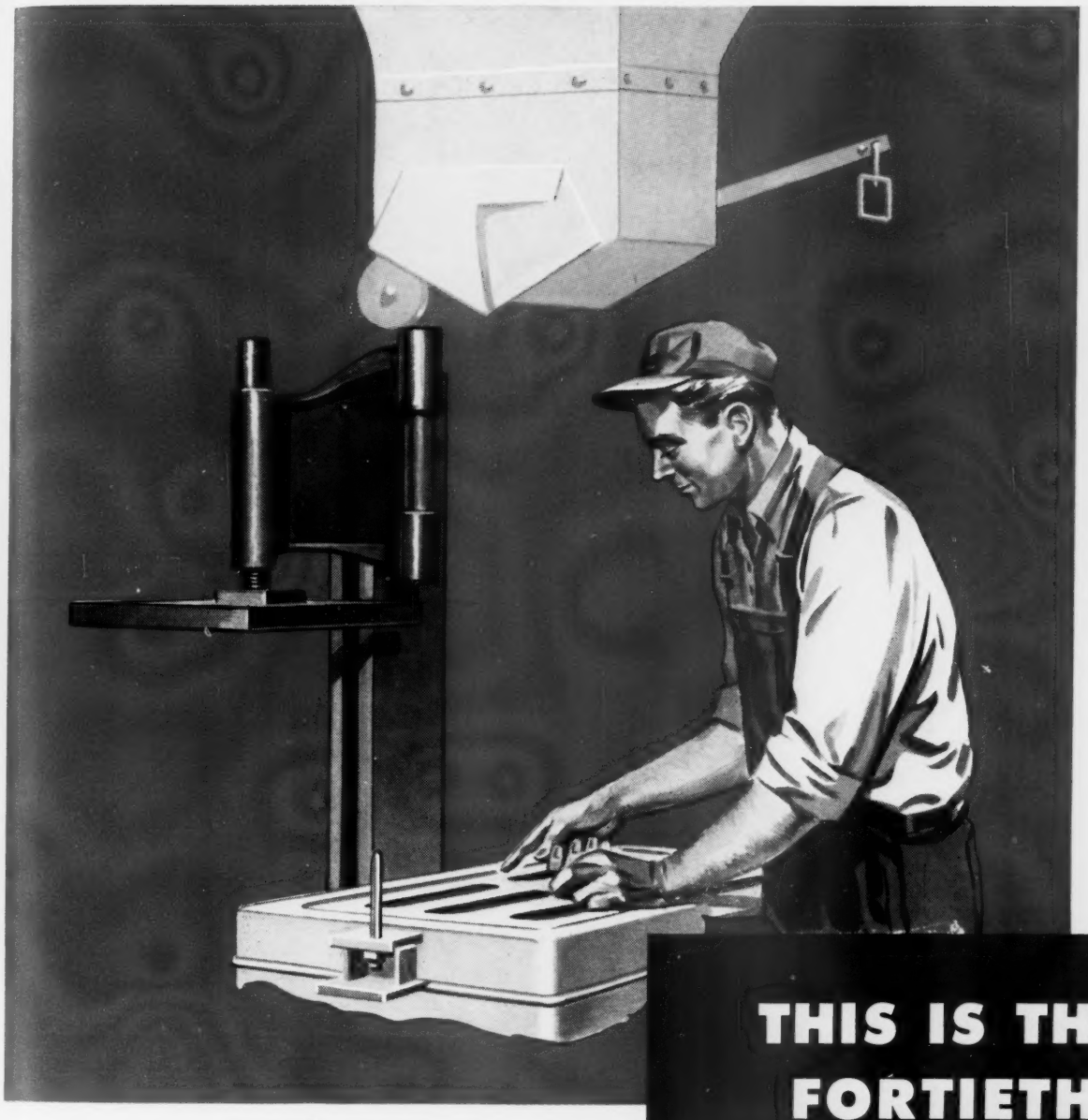

THIS IS THE FORTIETH MOLD . . .

from one application of

STEVENS LIQUID PARTING

That's normal experience in a large Midwest foundry that averages 1200 tons of castings per month. They use Stevens Liquid Parting for all of their molding operations. Here's why:

- Stevens Liquid Parting gives up to 60 molds from one application.
- Patterns are left clean, with no adhering sand.
- Molders save time . . . increase production with each mold because they do not have to shake parting on the patterns each time.
- Molds always give smooth castings since sand separates cleanly.

Stevens Liquid Parting can be the answer to your molding problems. Why don't you try Stevens Liquid Parting?

Write for a sample – or call your Stevens representative today.

FREDERIC B.
STEVENS
INCORPORATED
EVERYTHING FOR A FOUNDRY
DETROIT 16, MICHIGAN

OFFICES: DETROIT • BUFFALO • CHICAGO • CLEVELAND • NEW HAVEN • INDIANAPOLIS
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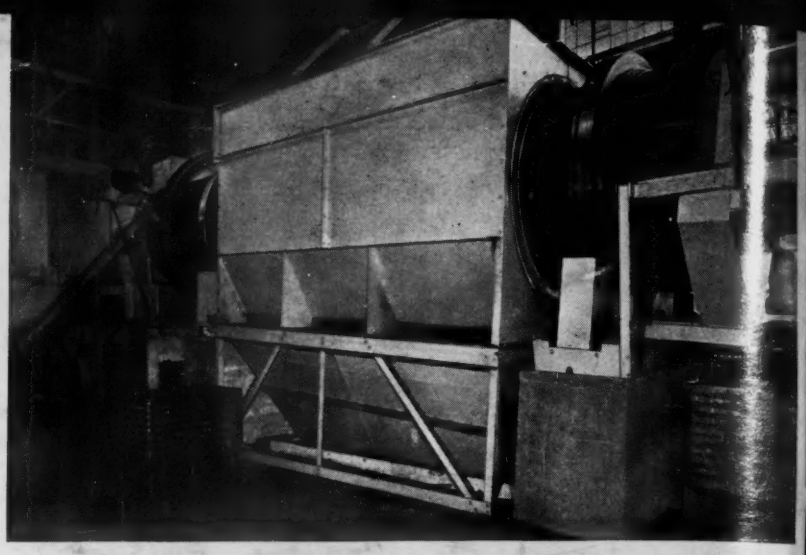
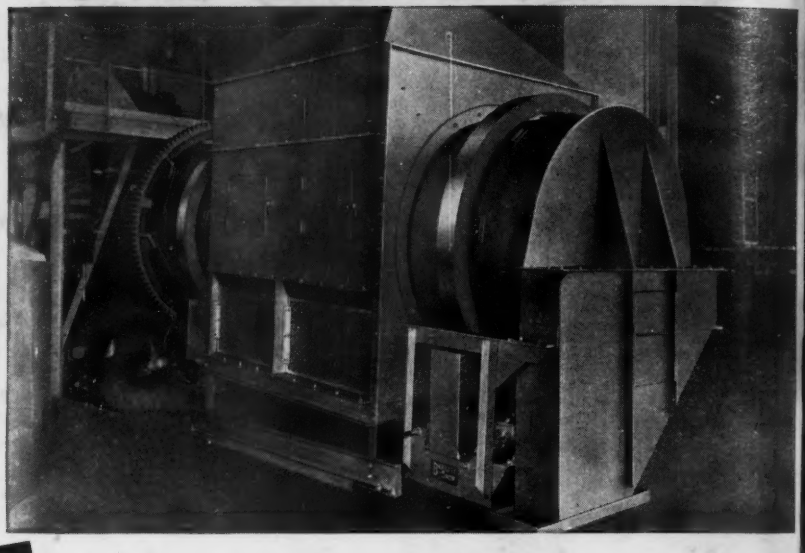
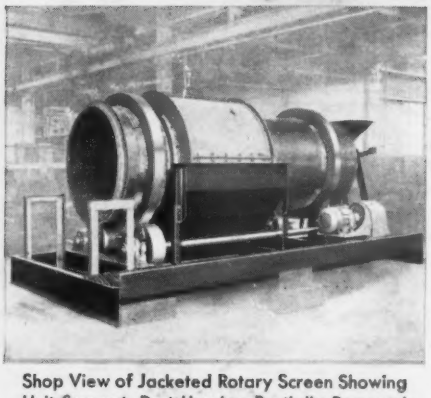


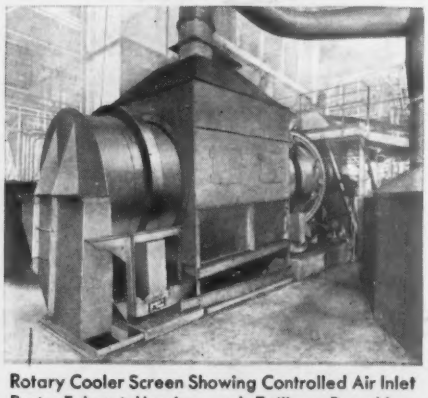


Above: Rotary Sand Cooler and Scalping Screen Handling 1200° F. Shakeout Sand. *Upper Right:* Rotary Cooler Screen with Exhaust Hood. *Lower Right:* Rotary Cooler Screen in Large Automotive Foundry.

do you have Hot Sand problems?



Shop View of Jacketed Rotary Screen Showing Unit Support. Dust Housing Partially Removed to Show Screen Cloth.



Rotary Cooler Screen Showing Controlled Air Inlet Ports, Exhaust Housing and Tailings Breeching.

Bartlett-Snow Rotary Cooler Screens offer a real solution. Unique design. Proven installations. When necessary, controlled additions of water assure the discharge of sand at 125° F or less, irrespective of feed temperatures.

Combined with the cooling of sand, these specially designed rotary units are available for breaking lumps — for scalping off troublesome sprues and tailings,— for fine sand screening, etc. Consult Bartlett-Snow for any cooler screen, breaker screen, rotary screen, scalping screen, hex screen, or sprue mill requirement.

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BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS
ERECTORS

Foundrymen Who Know — Buy Bartlett-Snow